

**GRAND FORKS - EAST GRAND FORKS
URBAN WATER RESOURCES STUDY**

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GRAND FORKS FLOOD FIGHT MANUAL

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**CORPS OF ENGINEERS
ST. PAUL DISTRICT
JULY 1981**

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structural measure that complements structural measures, both permanent and emergency. The flood control study found four measures which qualified for further study and possible implementation under the Corps' Small Projects Continuing Authority. An urban drainage master plan proposed for the developing fringe areas around Grand Forks would require future developments to incorporate ponding areas to temporarily store runoff to limit peak discharges, to those that occur under existing land conditions.

Flood emergency plans were developed jointly with both cities to improve their flood fight preparedness and effectiveness. Manuals, narrated slide programs and pamphlets were developed which covered: flood fight organizations and headquarters; responsibilities of local, state, and federal agencies; preflood, flood fight and post flood operations; emergency evacuation plans; and citizen self-help measures.

The Grand Forks-East Grand Forks Urban Water Resources Study consists of ten documents:

- Summary report
- Background Information Appendix
- Plan Formulation Appendix
- Water Supply Appendix
- Wastewater Management Appendix
- Flood Control and Urban Drainage Appendix
- Flood Emergency Plan for Grand Forks, North Dakota
- City of East Grand Forks, Minnesota, Civil Defense Flood Fight Plan
- Energy Conservation and Recreation Appendix/ Public Involvement Appendix
- Comments Appendix

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PREFACE

The Corps of Engineers Urban Study Program is aimed at providing planning assistance to local interests in a variety of water resource and related land resource areas, including water supply, wastewater management, flood control, navigation, shoreline erosion, and recreation. In areas of traditional Corps responsibility (such as flood control), the Corps may implement and construct projects shown feasible in the urban study. In other areas (such as wastewater management), Corps involvement carries only through the planning stage; findings are turned over to local interests for incorporation into their broad urban comprehensive planning effort. Implementation is at the discretion of local interests in conjunction with appropriate State and Federal agencies.

The St. Paul District, Corps of Engineers, conducted the Grand Forks-East Grand Forks (GF/EGF) Urban Water Resources Study, which was a cooperative effort between local, State, and Federal agencies. The GF/EGF urban study spanned a time of transition in the Corps urban study program. In mid-1978, directives were issued deleting the third and last stage of urban studies. At that time, the second stage of the GF/EGF urban study was nearing completion, and commitments for stage 3 studies had been made to local interests and involved State and Federal agencies. Therefore, the GF/EGF urban study was allowed to proceed to stage 3.

During the first stage, the 14-township study area was selected, broad topical problems to be addressed (water supply, wastewater management, and flood control) were identified, and a "plan of study" was developed.

The plan of study outlined the general approach the study would follow. During stage 2, the topical problems were broken down into explicit problem areas. Investigators formulated a broad array of alternatives to resolve the study area's problems. The alternatives were evaluated to eliminate those which were not suitable or cost effective. The stage 3 study examined in detail those alternatives that passed the stage 2 screening. Alternatives were reassessed to determine their respective cost-effectiveness and environmental/social impacts.

This particular document is 1 of 11 constituting the GF/EGF urban study report:

- Summary Report
- Background Information Appendix
- Plan Formulation Appendix
- Water Supply Appendix
- Wastewater Management Appendix
- Flood Control and Urban Drainage Appendix
- Flood Emergency Plan for Grand Forks, North Dakota
- City of East Grand Forks, Minnesota, Civil Defense Flood Fight Plan
- Energy Conservation and Recreation Appendix
- Public Involvement Appendix
- Comments Appendix

The Grand Forks flood emergency plan was developed jointly by the mayorally appointed Flood Emergency Plan of Action Task Force; the St. Paul District, Corps of Engineers; and Wehrman, Chapman Associates, Inc. (under contract to the St. Paul District). The plan is specifically designed to help Grand Forks prepare for and conduct flood fights. In effect, the plan is a nonstructural measure that complements structural measures, both permanent and emergency.

Work on the plan began in early 1980. Because the plan would not be completed before the spring flood season, the city's task force prepared an "interim manual" which ultimately was incorporated into the flood emergency plan.

It was clear from the start of the urban study's flood control investigation that permanent protection could not be justified for all flood-prone areas of the city. Some areas will continue to be unprotected or rely on temporary levees with flood fight guidance and organization provided by the flood emergency plan.

Areas with potentially justifiable permanent flood control improvements will continue to be susceptible to flooding for several years until the improvements are studied and, if found to be feasible, are authorized, funded, and constructed. These areas will use the flood fight plan to guide emergency measures until permanent protection becomes available. The plan will then be revised to cover activities and equipment associated with the permanent flood works, such as closures and pumping stations. The plan will also cover contingencies, for instance, if a flood were to exceed the design level of protection.

The original format of the flood fight manual differed from that of the other urban study reports because of the uniqueness of the manual as an evolving document which could find use in the field during a flood fight. Although this edition does not use the three-ring binder used in the original, the original format has been retained.

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Grand Forks
Flood Emergency Plan of Action

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Grand Forks
Flood Emergency Plan of Action

Chapter I

INTRODUCTION

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Chapter I

INTRODUCTION

NEED FOR PLAN

The city of Grand Forks, North Dakota, is subject to recurrent flooding by the Red River of the North and English Coulee. These floods result in substantial economic flood losses, threats to public health and safety, and human suffering. Even greater losses and related problems have been averted during recent large floods as a result of emergency flood fight measures and construction of emergency flood barriers. The Riverside Park and Central Park areas of the city have limited protection provided by emergency flood barriers constructed in the 1960's and subsequently raised and reinforced. However, these barriers were not designed or constructed in accordance with accepted practices for permanent flood barriers. They are experiencing subsidence problems and do not provide an adequate level of protection for this heavily urbanized area. The Lincoln Park levee and floodwall project is a federally constructed project which provides only a 30-year level of protection with 3 feet of freeboard. This barrier was nearly overtopped during the April 1979 flood.

Although emergency flood fight efforts have been generally successful, the potential for failure or overtopping of flood barriers together with other problems experienced during the April 1979 flood has made local officials and area residents increasingly aware of the need for a comprehensive flood emergency plan of action.

PURPOSE OF PLAN

The Flood Emergency Plan of Action contained in this manual is a comprehensive plan for preflood preparations, emergency flood fight and evacuation activities, and postflood activities. The plan draws extensively upon experience gained from previous flood fights, particularly the April 1979 flood. The plan and the extensive technical data provided therein will improve the coordination and conduct of future flood fights.

The plan sets forth the criteria and procedure for initiating a flood fight, the organizational structure, and coordination mechanisms between various levels of government and between the government and the public. The plan provides the technical data base and requirements for construction of emergency flood barriers and outlines timely and effective evacuation efforts. It also outlines the procedures for post-flood inspections and cleanup and the procedures for requesting post-flood government assistance.

SCOPE OF PLAN

The area addressed by the plan includes the entire city of Grand Forks. Of primary interest is the safety of the several thousand residents who live within the Red River of the North and English Coulee floodplains. The plan considers in detail approximately 1200 residents who may be adversely affected by a sudden failure or overtopping of existing flood barriers. A map of the city showing the locations of existing flood barriers is given on Plate I-1.

The plan does not provide detailed coverage of flood emergency activities of the University of North Dakota at Grand Forks because these efforts are effectively accomplished by the University. However, coordination between the city and the University to achieve a complementary flood fight effort is briefly discussed.

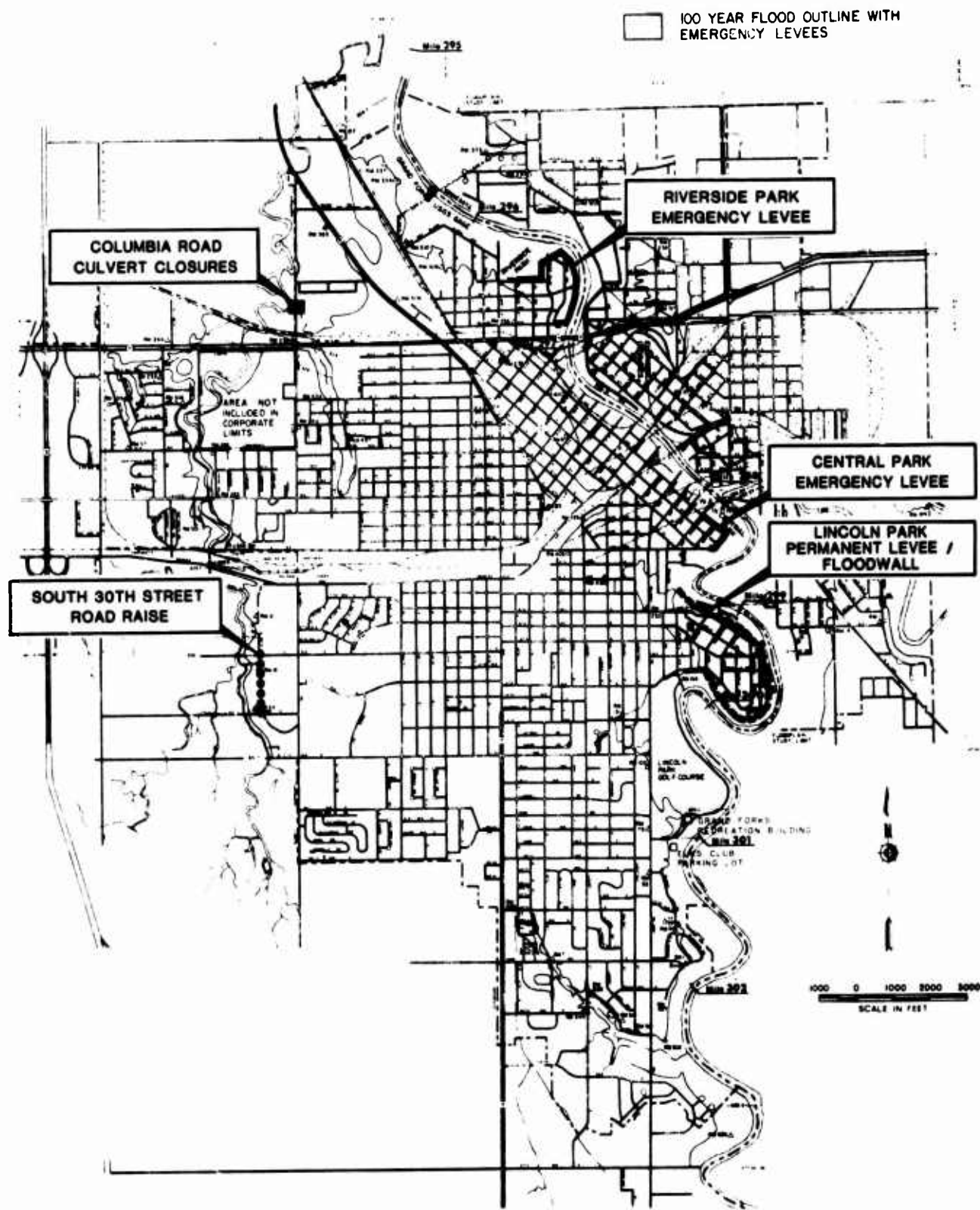
The plan discusses emergency flood fight activities at East Grand Forks, Minnesota, which are of mutual interest. These activities principally include the coordination of Red River of the North bridge closures and movement of people between the two cities.

The loose-leaf format of this manual⁽¹⁾ is designed to accommodate updates which will be required over the years as a result of changing personnel, material inventories, flood barriers, and urban development.

¹The original manual was bound in a three-ring hard-covered notebook for ease in accommodating future revisions.

PREPARATION OF PLAN

This emergency plan of action was developed through the combined efforts of the Mayor's appointed Flood Emergency Task Force; St. Paul District, Corps of Engineers; and Wehrman, Chapman Associates, Inc. Close coordination was maintained with all city departments and affected county, State, and Federal agencies to obtain data and identify coordination mechanisms. Local suppliers of needed equipment and materials were contacted to identify inventory sources. Similar contacts were made with area schools and other facilities to provide emergency housing and related care. Neighborhood groups affected by flooding were identified and contacted to establish coordination and public information procedures.



GRAND FORKS FLOOD EMERGENCY PLAN
**EXISTING
FLOOD CONTROL MEASURES**

Grand Forks
Flood Emergency Plan of Action

Chapter II

COOPERATING ORGANIZATIONS

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Chapter II COOPERATING ORGANIZATIONS

GENERAL

This chapter discusses agencies and organizations expected to have a role in Grand Forks flood emergency activities. It includes brief descriptions of the agencies' and organizations' responsibilities and functions relative to flood emergency activities. A list of agency contact personnel and their phone numbers is given in Table II-1 at the end of this chapter.

LOCAL AGENCIES

Grand Forks City Mayor's Office

The Mayor's office has overall responsibility for all city functions including the provision of emergency activities during a major flood fight. The Mayor's office coordinates all requests for State and Federal assistance. This office, in cooperation with the City Civil Preparedness Director and Director of Public Works, makes the determination as to the advisability and timing of emergency flood fight activities.

Grand Forks City Civil Preparedness Director

The Grand Forks City Fire Chief serves as the Civil Preparedness Director and has overall responsibility for civil defense activities during nuclear and natural emergencies. Functioning under the overall direction of the Mayor, the Civil Preparedness Director has the principal responsibility for directing emergency flood fight activities in the field.

The Civil Preparedness Director, in concert with the Mayor's office and Director of Public Works, determines the need for and time of commencement of an emergency flood fight based on flood forecasts from the National Weather Service (NWS). The Civil Preparedness Director gives the order to establish and staff the Emergency Operations Center (EOC) from which all flood fight activities are directed. Working with three designated assistants who manage daily activities of the EOC, the Civil Preparedness Director is responsible for all flood fight activities, including preflood education and preparation; construction, inspection, and maintenance of emergency flood barriers; evacuation measures; interdepartmental and interagency coordination; public communications; and postflood inspection and cleanup activities.

Grand Forks City Fire Department

The Fire Department has about 60 fire fighters available at all times, including emergency flood situations. In addition to the normal activities of fire fighting, life saving, and property protection, the department's functions during a flood emergency include:

- Providing emergency rescue and evacuation of stranded residents
- Coordinating activities of National Guard and U.S. Coast Guard in rescue operations
- Securing floating fuel tanks and treating and/or containing floating hazardous materials
- Assisting the elderly and infirm to shut off furnaces, lights, and other electrical appliances to secure threatened buildings
- Filling basements with clean water when requested by affected residents to prevent buckling of walls or floor slabs.

Grand Forks City Police Department

The Police Department generally has about 60 officers available, with most available for extra duty as needed during an emergency. In addition to its normal functions, the department's responsibilities during flood

emergencies include:

- Providing security to evacuated areas
- Controlling traffic and sightseers in affected areas and along evacuation routes
- Designating guard post locations for National Guard and other assisting personnel
- Maintaining close telephone communications with the EOC
- Setting up radio communication equipment at the EOC
- Coordinating levee patrol activities with neighborhood groups

Grand Forks City Public Works Department

The Public Works Department provides all planning, engineering, inspection, water supply, wastewater, solid waste disposal, and street maintenance services. About 80 of the department's 144 people would be available for flood-related duty.

The department is responsible for maintaining its normal services to the extent possible during an emergency. Additional flood-related responsibilities include:

- Placing closures in existing flood barriers
- Installing sewer closures to prevent floodwater backup
- Sandbagging sewer manholes to prevent overflow
- Sandbagging sanitary and storm sewer pumping stations
- Providing temporary flood barriers
- Storing and distributing equipment and materials
- Providing technical advice for construction of emergency barriers
- Identifying the locations where flood barrier raises or new barriers are needed

Additional discussion concerning the emergency responsibilities of the Public Works Department is given in later chapters of this manual.

Grand Forks City Health Department

The Health Department is responsible for public health and nursing services and environmental health (food inspection) services and has general authority to abate health problems as they arise. The department has a director and about five full- or part-time personnel available during an emergency situation. The Health Department Director has been designated a commander of the EOC by the Civil Preparedness Director. Specific department functions during a flood emergency include vector control and the surveillance of potable water supplies, sewage treatment, and refuse and garbage collection. Department personnel assist in providing emergency medical treatment, such as inoculations. The part-time Grand Forks City Health Officer has the authority for issuing health-related directives and decisions during a flood emergency.

Grand Forks City Park and Recreation Department

This department develops and manages the park, recreation, and forestry resources of the city. Up to half of the department's 20 personnel are generally available for flood-related duties. Principal flood emergency responsibilities include providing temporary flood barriers around park structures and cleaning up and repairing damaged buildings and grounds.

Grand Forks City Personnel Director

The Personnel Director normally functions within the Mayor's office on personnel matters. However, the Personnel Director has been designated by the Civil Preparedness Director to serve as a commander of the EOC during flood emergencies.

COUNTY AGENCIES

Grand Forks County Civil Defense Director

The Civil Defense Director coordinates nuclear and natural disaster activities for the county. His office is located in the City Police Building near the EOC. He maintains close communication with the Civil Preparedness Director and the Director of the North Dakota Disaster Emergency Services office in Bismarck. The Civil Defense Director assists the city in obtaining required communications and other assistance from the county, State, and Grand Forks Air Force Base as needed.

STATE AGENCIES

State agencies which have had or could be expected to have a significant role in a flood emergency at Grand Forks are discussed in the following paragraphs.

North Dakota Disaster Emergency Services (DES)

The North Dakota Disaster Emergency Services (DES) office address is P.O. Box 1817, Bismarck, ND 58505. The DES telephone number during business hours is 1-224-2111; after hours, 1-800-472-2121.

The DES provides before-the-fact assistance in the form of planning and training for disasters; on-site assistance with local emergency communications, National Guard activation, and situational reporting to the DES Bismarck office; and postdisaster recovery assistance.

The DES is an essential link in the process leading to "freeing up" State resources, which may in turn lead to a Federal disaster declaration and ultimately to Federal assistance, financial and technical. The DES is often the first outside agency to contact if a flood or other situation may overtax the local government's capabilities.

Although the DES may bear the brunt of the situation reporting that the State requires, it is imperative that local managers keep adequate records to assist the DES and authenticate their emergency activities and expenses for reimbursement in case of a disaster declaration.

Because the DES is part of the nationwide Civil Preparedness Organization, the County Civil Defense Director or City Civil Preparedness Director should make the initial contact.

National Guard

The National Guard may be activated only when the situation is judged to be beyond the control of the local (county and/or city) jurisdiction.

The Guard may be alerted in two ways. The Mayor may request Guard assistance through the Governor, who will then normally request a report on the matter from the Adjutant General and the DES. Or the County Civil Defense Director or City Civil Preparedness Director may request Guard assistance directly from the DES.

Because the current North Dakota State organization calls for a high-ranking Guard officer to be in charge of the DES, it makes little difference which route is used. As a practical matter, both should probably be attempted.

The "beyond local control" requirements is often liberally construed. For instance, a request for assistance would probably be approved on the basis of a projected flood crest, even though the current water level is causing no difficulties.

The local jurisdiction does not have to be in dire financial straits; a declaration that the Emergency Fund is depleted, or nearly so, may

get results. However, it is necessary that the locality expend reasonable efforts on its own behalf before calling for assistance. If a local jurisdiction is in doubt about whether it qualifies for Guard help, the Civil Preparedness Director should telephone the DES and give a situation report. A Guard unit may require training in the type of situation the locality is experiencing, and a simple "need" declaration may be sufficient.

There is no direct cost to the locality for Guard assistance. The capabilities of the Guard are many and varied and are discussed later in this manual. In addition to providing manpower and equipment for flood fighting, the Guard can also be used for security purposes under the direction of the local Chief of Police. Services provided by the Guard include:

- Personnel for traffic control
- Personnel and equipment for evacuation
- Personnel and equipment for both ground and water search and rescue missions
- Personnel and equipment for site security and maintenance of law and order
- Personnel and equipment for transportation of mass casualties
- Personnel and equipment for emergency-related hazardous waste disposal
- Generators for emergency restoration of electric power to facilities providing emergency services
- Transportation and support in the movement, distribution, and storage of sandbags
- Assistance to local governments in the preparation of temporary housing sites complete with utility hookups
- Personnel and equipment to establish field kitchens

Area National Guard units which have responded to Grand Forks flood emergencies in the past include the Army National Guard (Military Police) unit at Hillsboro, North Dakota, and the Air National Guard unit at Fargo, North Dakota.

North Dakota State Water Commission

This agency would have only a limited involvement in a flood emergency. Typical responsibilities would include:

- Coordinating removal of debris from floodways and water control facilities
- Coordinating distribution of agency water pumping equipment
- Assisting in assessing debris cleanup and damage repair costs at State water control facilities

North Dakota State Health Department

This department is responsible for the coordination of health and medical support services during an emergency. Functions and services provided upon request during a flood emergency may include:

- Assisting supervision of vector control operations
- Coordinating and supervising mass immunization programs to control communicable diseases
- Assisting coordination of hazardous waste disposal activities
- Coordinating effective use of available hospital resources
- Coordinating transportation of mass casualties and establishment of emergency mortuary services
- Coordinating mental health services, including crisis counseling assistance

Other services provided by the State Health Department are covered in the North Dakota Disaster Emergency Plan.

North Dakota Social Services Board

This agency assists displaced residents during and immediately after a disaster. Services during a flood emergency would typically include:

- Administering the Federal Emergency Food Stamp program
- Coordinating the provision of temporary housing facilities

- Registering evacuated residents in need of emergency assistance
- Providing emergency clothing for residents left destitute by flood losses.

FEDERAL AGENCIES

National Weather Service

The National Oceanic and Atmospheric Administration (NOAA), National Weather Service (NWS) office at Fargo, North Dakota, provides rainfall and snowmelt advisory flood forecasting service for the Red River of the North and its major tributaries. The NWS predicts given stages at particular gages in the basin on the basis of observed precipitation and flow at upstream points as well as anticipated weather conditions. These forecasts are revised on the basis of changing climatic and hydrologic conditions. The flood forecast is transmitted to local officials, newspapers, and radio and television stations. These sources disseminate the information to residents of the floodplain in the form of a flood warning. Forewarning permits industrial plants, public utilities, municipal officials, and individuals with property in the lowlands to take protective measures.

U.S. Geological Survey (USGS)

The USGS is responsible for obtaining flood stage measurements at the gaging station located in the old city sewage treatment plant at river mile 295.7. Stage measurements are taken at other river locations on an as needed basis. These data are provided to the NWS and other agencies to aid in forecasting flood stages.

Federal Emergency Management Agency (FEMA)

Upon the determination of an emergency or a declaration of major disaster by the President, the Administrator (Washington D.C.) or Regional

Director (Denver, Colorado) of FEMA may direct any Federal agency to provide the following kinds of assistance to State and local governments:

- Using or lending agency equipment, supplies, facilities, personnel, and other resources
- Distributing medicine, food, and other consumable supplies
- Preparing damage surveys and assessment reports
- Coordinating relief organization efforts
- Providing emergency communications
- Providing emergency mass care if all efforts by others are insufficient
- Granting individual and family financial aid

U.S. Coast Guard

All U.S. Coast Guard forces responding to flooding in the Red River of the north area are under the operational control of the Commanding Officer, Marine Safety Office, Minneapolis/St. Paul, Minnesota, 180 East Kellogg Blvd., P.O. Box 3428, St. Paul, Minnesota 55165 (telephone 612-725-7452). He coordinates the deployment of Coast Guard personnel and flood relief equipment to the area from units throughout Minnesota, Iowa, North Dakota, South Dakota, and Nebraska to provide emergency water transportation for evacuees. In addition, the unit provides water transportation as needed to facilities isolated by floodwaters to obtain food, medical supplies and assistance, sandbags, and other supplies. The Coast Guard provides all of its own operating equipment.

U.S. Army Corps of Engineers

Corps of Engineers' participation in emergency flood activities is authorized by Public Law 84-99. This act provides for disaster preparedness and advance measures before an imminent disaster, assistance

in flood fighting and rescue operations, and postflood rehabilitation of flood control facilities. The Corps is also authorized to provide emergency supplies of clean drinking water when depleted or contaminated sources present a threat to public health and safety.

When the NWS predicts imminent unusual flooding, Corps advance measures can be taken before actual runoff. Requests for assistance from local officials through the Governor may include creation of an area office in the city; acquisition and deployment of sandbags, polyethylene, pumps, and other supplies and equipment; inspection of federally constructed and non-Federal flood control works; and construction of temporary flood barriers.

With the onset of a flood emergency and at the request of State and local governments, the Corps may dispatch action teams to threatened areas to assist flood fight and rescue operations. Contracts are made with private contractors to construct emergency flood barriers. Technical advice is provided on the evacuation of threatened areas and efficient placement of temporary flood barriers and drainage works. Rescue operations may be accomplished through procurement of vehicles and equipment. Flood data are obtained and assessed by Corps personnel to guide the flood fight.

When flood fight or other disaster relief efforts are completed, the Corps may be involved under Public Law 84-99 authority in the rehabilitation or repair of damaged flood works. Following a Presidential disaster declaration, the Corps District office may be directed by the FEMA regional office in Denver, Colorado, to survey and report on damages to public or nonprofit facilities and make final inspection reports once repairs have been completed. In limited instances, such as extensive flood damages in a concentrated area of development, the Corps may be directed by FEMA to remove debris, restore utilities, or do other major relief work, including providing temporary housing. More information on Corps of Engineers Emergency Services is given in Appendix 1 to this manual.

Grand Forks Air Force Base

The Grand Forks Air Force Base is very well-equipped to assist us during a flood emergency. With the possible exceptions of boats and blasting, they are a resource for almost everything needed.

The best procedure to follow is to call the GFAFB Disaster Control Office, and state your requirements. This can be done on an informal basis, as Mr. Bill Owen, the Disaster Control Officer, will very probably be assisting Dr. Sondreal during the duration of the emergency. Mr. Owen's office no. is 594-6496 - home 543-3538.

If Mr. Owen is unavailable for any reason, a more formal request, preferably from the Civil Preparedness Coordinator or the EOC Commander, must be made to the Base Commander at 594-6502 or 594-6011 after hours. A brief description of the need to be met, coupled with a declaration that the item(s) sought are not immediately available elsewhere, should produce positive results. During a recognized emergency the base is not likely to be excessively critical of a bona fide request for help.

All types of light and heavy equipment, their operators, and volunteer sandbaggers may be provided by the base depending on their availability. Some transportation for base volunteers may have to be furnished by the EOC.

The GFAFB is also the temporary emergency care facility for a mass evacuation of the city.

Additional information on emergency assistance provided by the various Federal agencies usually involved in flood fight activities can be obtained by contacting the local or regional offices of those agencies.

OTHER GROUPS AND ORGANIZATIONS

American Red Cross

The Grand Forks Area Chapter of the American Red Cross provides disaster relief services during major floods. Approximately 100 people in the Grand Forks area are trained Red Cross volunteers. This organization provides trained nursing care, housing and feeding assistance, and other related services.

The degree of Red Cross involvement depends on the severity of the emergency. The local chapter handles all disaster situations generating up to five calls for help. For situations of greater severity the following offices of the Red Cross will be called on in ascending order:

- Chapter Headquarters in Grand Forks
- Regional Headquarters in Jamestown, North Dakota
- District Headquarters in Minneapolis, Minnesota
- Midwestern Headquarters in St. Louis, Missouri
- National Headquarters in Washington D.C.

The area Chapter Executive and Chapter Chairman have the authority to take action in response to an emergency call. These persons are supported by the following local volunteers who handle specific operational tasks:

- Chairman of Volunteers
- Food Coordinator
- Shelter Provider
- Chairman of Disaster Nursing
- Communications Chairman

Salvation Army

The Salvation Army at Grand Forks provides a variety of emergency relief services, including emergency food preparation and distribution,

clothing, and shelter. A mobile canteen is available to provide emergency food, first aid, and other services. The local unit is assisted by division headquarters in Bismarck, North Dakota, in providing emergency welfare services when local resources are insufficient. Further assistance may be provided by the territorial and national offices of the Salvation Army depending on the severity of the emergency.

Civil Air Patrol

The Civil Air Patrol chapter in Grand Forks is a public service-oriented organization of about 30 members, all of whom are trained in basic First Aid.

Their missions include airborne search and rescue, reconnaissance, aerial surveys, and emergency air transportation. Person(s) to call for assistance include:

Sgt. Mark Schiebe, Commander
work: 594-3525 or 594-3551
home: 865-4152

Mr. Kenneth A. Hanson, Air Operations Officer
work: 781-2777
home: 746-7124

One Cessna C-172 aircraft based at the Grand Forks International Airport and four others spotted around the State may be called in if needed. Radio communications can be maintained with the aircraft using the ND DES radio in the EOC.

The Civil Air Patrol also owns and operates a 1-1/4 ton four-wheel drive, watertight ambulance-type vehicle for operation in semi-flooded areas.

There is no cost to the city for any mission the CAP undertakes.

Church Groups

Church groups in Grand Forks provide food, housing, and social welfare services. The Mennonite church may provide other valuable assistance including assisting in emergency flood works, evacuation measures, search and rescue operations, postflood cleanup, and restoration of damaged facilities. These volunteers may also assist other relief organizations such as the Red Cross in carrying out their mission.

Neighborhood Groups

Neighborhood organizations provide effective communication with residents during a flood emergency. Emergency flood directives and requests for volunteer assistance can be channeled through these organizations. Supervision of the dike patrols is probably the most important function of these groups. The name, address, and telephone number of the principal contact person for each of these groups are also given in Table II-1.

Table II-1 - List of Agencies and Group Contact Personnel

<u>Agencies</u>	<u>Address</u>	<u>Telephone</u>
<u>LOCAL AGENCIES</u>		
G.F. Mayor's Office	City Hall 404 2nd Avenue North Grand Forks, N.D. 58201	1-701-775-8103
G.F. Civil Preparedness Director	Richard Aulich Fire Department 1200 DeMers Avenue Grand Forks, N.D. 58201	1-701-775-2548
G.F. Fire Department	Richard Aulich 1200 DeMers Avenue Grand Forks, N.D. 58201	1-701-775-2548
G.F. City Police Department	Mr. James O. Clague 122 South 5th Grand Forks, N.D. 58201	1-701-772-7171
G.F. Public Works Department	Frank Orthmeyer City Hall 404 2nd Avenue North Grand Forks, N.D. 58201	1-701-775-8103
G.F. City Health Department	Ken Schultz Grand Forks Health Department Police Building 122 So. 5th St. Grand Forks, N.D. 58201	1-701-775-8103
G.F. City Park & Recreation Department	Richard Leker Grand Forks Park Board 1210 7th Avenue South, Box 248 Grand Forks, N.D. 58201	1-701-775-4665
G.F. City Personnel Director	Jay Grayba City Hall 404 2nd Avenue North Grand Forks, N.D. 58201	1-701-775-8103
<u>COUNTY AGENCIES</u>		
G.F. County Civil Defense Director	Dr. H.E. Sondreal 212 South 4th Grand Forks, N.D. 58201	1-701-775-6219

<u>Agencies</u>	<u>Address</u>	<u>Telephone</u>
<u>STATE AGENCIES</u>		
N.D. Disaster Emergency Services	Ron Affeldt P.O. Box 1817 Bismarck, N.D. 58505	1-701-224-2111
National Guard	Secretary, State Disaster Services	1-701-224-2111
N.D. State Water Commission	Vern Fahy State Office Building Bismarck, N.D.	1-701-224-2750
N.D. State Health Department	N.D. State Health Department Bismarck, N.D. 58505	1-701-224-2370
N.D. Social Services Board	N.D. State Social Services Board Bismarck, N.D. 58505	1-701-224-0310
<u>FEDERAL AGENCIES</u>		
National Weather Service	Hector Field Fargo, N.D.	1-701-235-0756
U.S. Geological Survey	Oren Holmen Federal Building 102 North 4th Grand Forks, N.D. 58201	1-701-775-7221
Federal Emergency Management Agency	Region 5 Office Denver, Colorado	1-303-234-6582
U.S. Coast Guard	Lt. Cmdr. Steve Hungness P.O. Box 3428 St. Paul, Minnesota 55156	1-612-725-7452
U.S. Army Corps of Engineers	District Engineer 1135 U.S. Post Office and Custom House St. Paul, Minnesota 55101	1-612-725-7501

<u>Agencies</u>	<u>Address</u>	<u>Telephone</u>
<u>OTHER GROUPS AND ORGANIZATIONS</u>		
American Red Cross	LuVerne Jensen 315 North 4th Street Grand Forks, N.D. 58201	1-701-772-2411
Salvation Army	Lt. Robert Gauthier Corps Community Center 418 North 6th Street Grand Forks, N.D. 58201	1-701-775-2597
Mennonite Disaster Relief	Alvin Bontramger Box 421 Bemidji, Minnesota 56601	1-218-751-9344
Wesley Methodist Church	Rev. Norman Neumann 1600 4th Ave. North Grand Forks, N.D. 58201	1-701-772-1869
Dakota Deep Divers	Mr. Ronald Racine after hours Mr. James Broten home	1-701-746-6411 1-701-746-5534 1-701-775-2548 1-701-775-0232
University of North Dakota (For student release info.)	Mr. William Bryan Dean of Students after hours	1-701-777-2724 1-701-772-8862
Grand Forks Public Schools (For student release info.)	Dr. Mark S. Sanford after hours	1-701-775-3111 1-701-772-4236
Hydrologist/Meteorologist	Mr. Robert Barnick after hours	1-701-223-4582 1-800-472-2297
Grand Forks Herald*	Mr. Herschel Kenner home	1-701-775-7838 1-701-775-4337
<u>NEIGHBORHOOD GROUPS</u>		
Central Park Neighborhood Association	Henry Tomasek 724 South 3rd Street Grand Forks, N.D. 58201	1-701-772-1236
Riverside Park Neighborhood Association	Harold Gersham 1605 Riverside Drive Grand Forks, N.D. 58201	1-701-775-9232

* See Appendix 1 for listing of other newspaper personnel who can be contacted for assistance.

<u>Agencies</u>	<u>Address</u>	<u>Telephone</u>
<u>NEIGHBORHOOD GROUPS (Continued)</u>		
Lake Agassiz Neighborhood Association	John Novick 902 Shakespear Road Grand Forks, N.D. 58201	1-701-772-0863
Southwest Area Neighborhood Organization	Ben Kaufman 2410 11th Avenue South Grand Forks, N.D. 58201	1-701-772-7709
Near North Side	Elliot Glassheim 619 North 3rd Street Grand Forks, N.D. 58201	1-701-772-8840
University Park Area	Janet Olson 618 North 24th Street Grand Forks, N.D. 58201	1-701-775-9185
Lincoln Park	Lloyd Olson 715 Lincoln Drive Grand Forks, N.D. 58201	1-701-772-5318
Belmont Coulee	Lawrence Bach 403 Terrace Drive Grand Forks, N.D. 58201	1-701-775-6077
Belmont Road	Tom Berge 1113 Reeves Drive Grand Forks, N.D. 58202	1-701-775-8905

Grand Forks
Flood Emergency Plan of Action

Chapter III

ORGANIZATIONAL STRUCTURE

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Chapter III ORGANIZATIONAL STRUCTURE

CHAIN OF COMMAND

By virtue of his position, the Mayor has overall responsibility for all city functions and activities, including the provision of emergency services.

Delivery of these emergency services, including planning and operational supervision during an actual disaster or emergency, is normally accomplished through the City of Grand Forks Civil Preparedness Agency set up by city council resolution dated March 3, 1980. The City of Grand Forks Civil Preparedness Agency is directed by a Civil Preparedness Director/Coordinator according to the job description for that position adopted by the city council on December 3, 1979. The current Civil Preparedness Director/Coordinator is also the city Fire Chief. In the city Civil Preparedness Director's absence, the city Personnel Director, who is the Deputy Civil Preparedness Director for Flood Emergencies, will assume his responsibilities. The Civil Preparedness Director's assistant will then assume the Personnel Director's EOC responsibilities.

The Director of Public Works is responsible for all field engineering operations and material supply activities during a flood fight.

The EOC (Emergency Operations Center) Commanders are responsible for coordinating all flood fight activities and services provided by the Police, Fire, and other city departments. They are also in charge of Dike Patrol, Armory Operations, and the three mobile command posts, and are expected to coordinate the activities of the volunteer support groups such as the American Red Cross and Salvation Army. The EOC will handle all inquiries from the public. The EOC will operate on a 24-hour basis during a full-scale flood emergency.

The Police Department will coordinate the security services provided by the National Guard. The Armory Commanders will supervise and coordinate the sandbag production unit at the central sandbagging site at the Armory parking lot.

A chart showing the flood fight organizational structure is shown on Figure III-1. A list of key designated flood fight personnel with their office and home telephone numbers is given in Table III-1.

COORDINATION

Coordination of flood fight activities is probably the most important element in a successful flood fight and disaster relief effort. The following paragraphs discuss typical coordination responsibilities during a flood fight.

The Mayor is responsible for coordinating all requests for assistance with county, State, and Federal authorities. The Mayor will make any declaration of emergency and request a similar State declaration when city resources will probably be or already are insufficient to meet emergency needs. The Mayor will also coordinate with the Civil Preparedness Director and Director of Public Works to determine the need for and timing of a flood fight.

The Civil Preparedness Director coordinates all city flood fight and disaster relief efforts. The Director coordinates city activities with the county Civil Defense Director, the State Director of Disaster Emergency Services, and the University of North Dakota at Grand Forks. The Civil Preparedness Director also assures that optimum coordination is maintained between engineering operations and the EOC.

The EOC Commanders will insure that close coordination exists between the various services and operations in their charge, and shall furnish information and assistance as requested by the Director of Public Works.

The Public Works Director, in close coordination with the Civil Preparedness Director, will coordinate the field flood fight activities of Public Works Department personnel including the provision of needed technical advice to the EOC Commanders. He will also maintain close coordination with on-site Corps of Engineers personnel regarding the need for construction, inspection, and maintenance of emergency flood barriers.

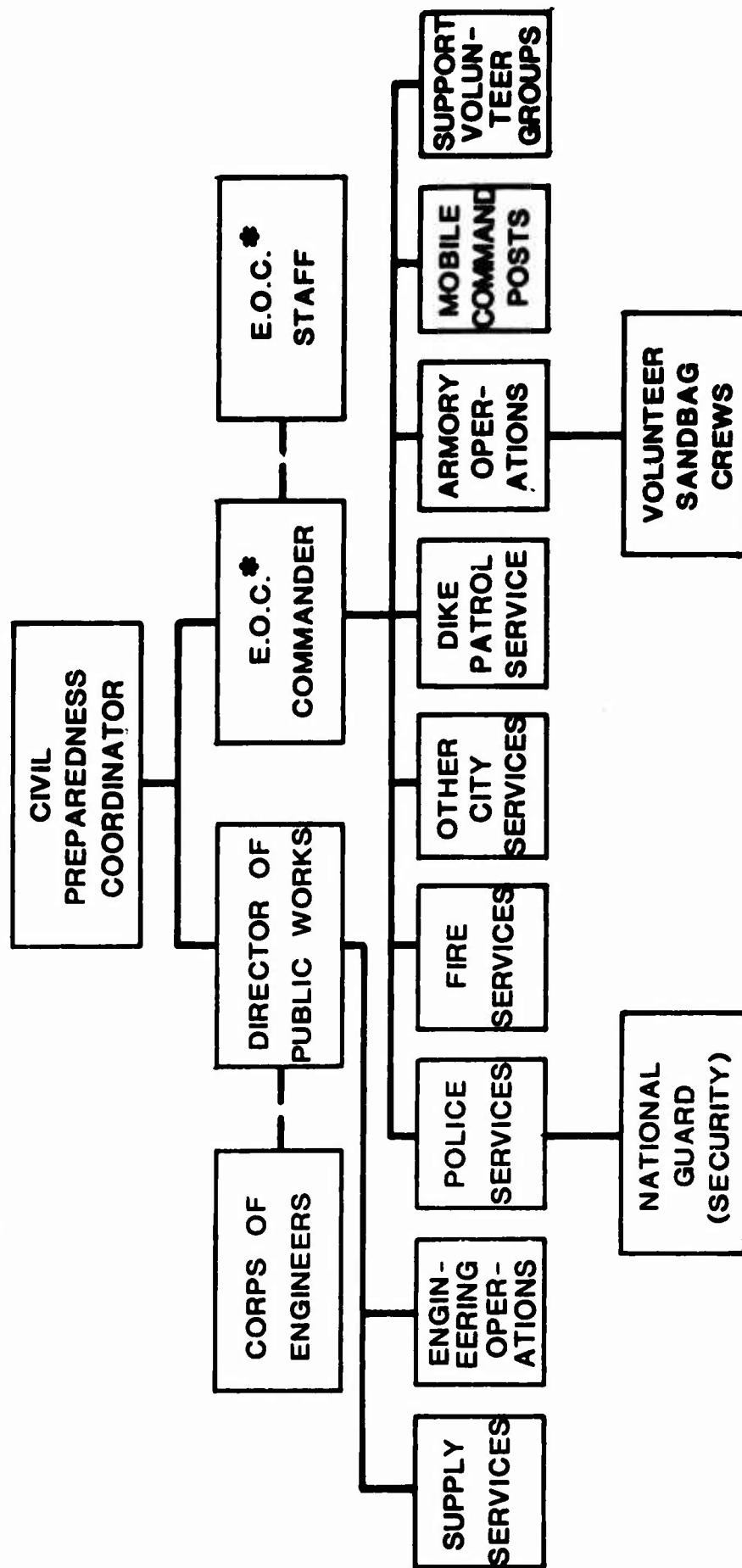
The City Police Department coordinates street and bridge closures with the Director of Public Works. The Police Department also coordinates personnel from the Army or Air National Guard units that assist in traffic control and security. The Fire Department coordinates U.S. Coast Guard units assisting in search and rescue and emergency transportation. Additional coordination requirements during a flood emergency are discussed in subsequent chapters.

Table III-1 - Key Flood Fight Personnel*

<u>Key Personnel</u>	<u>Office Telephone</u>	<u>Home Telephone</u>
MAYOR	775-8103	
DIRECTOR OF PUBLIC WORKS		
Frank Orthmeyer	775-8103	775-2687
Assistant - Keith Johnson	775-8103	772-3314
CIVIL PREPAREDNESS DIRECTOR		
Richard Aulich	775-2548	746-7808
COUNTY CIVIL DEFENSE DIRECTOR		
Dr. Homer Sondreal	775-6219	
POLICE CHIEF		
James Clague	772-7171	772-7171
Assistant - Clarence Sunderland	772-7171	775-7126
FIRE CHIEF		
Richard Aulich	775-2548	746-7808
Assistant - Richard Felton	775-2548	772-5218
EOC COMMANDERS		
Robert Bushfield	775-8103	775-5830
Jayson Graba	775-8103	775-7273
Kenneth Schultz	775-8103	775-9576
ARMORY COMMANDERS		
Ray LeClerc	775-8103	772-5714
Roger Allard	775-2548	772-6419
Richard Westacott	775-2548	775-8052

*Because it is impossible to determine which person(s) will be occupying all the slots on the flood fighting table of organization in the future, only those persons who have been presently (1980) designated are included here. This list will be updated annually in February.

FLOODFIGHTING ORGANIZATION



* E.O.C. EMERGENCY OPERATION CENTER

FIGURE III-1

Grand Forks
Flood Emergency Plan of Action

Chapter IV

FLOOD THREAT

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CHAPTER IV FLOOD THREAT

HISTORICAL DATA

Grand Forks is subject to periodic flooding by the Red River of the North. Principal factors contributing to this flooding include the very flat river slope, the northward drainage, and channel constrictions. The low river slope of one-half foot per mile and resultant low velocities retard drainage from the area. The flow of surface runoff from southern areas into still frozen river reaches frequently results in ice jams and increased river stages. Bridges, particularly the Burlington Northern Railroad and DeMers Avenue Bridges obstruct flood flows at higher stages.

The city is subject to spring flooding resulting mainly from snowmelt runoff and summer flooding resulting from heavy rains. The 1965 flood was an exception, and was caused principally by heavy, widespread rainfall over deeply frozen soils.

GAGING STATIONS

Records of river stage and discharge on the Red River of the North have been maintained since 1882. Early observations were taken on a nonrecording gage which was relocated several times from 1882 to November 1933; however, all readings have been related to the present gage location. From October 1926 to November 1933, staff gages were located near the present gage site. Between November 1933 and April 1965, a recording gage was located 0.3 mile upstream from the present gage site. The present USGS gaging station is in the old Grand Forks sewage treatment plant at river mile 295.7. The equipment is a continuous water stage recorder with bubble gage attachment. The reference datum remains 778.35 feet above mean sea level (M.S.L.), 1929 adjustment. A list of the ten largest floods of record at Grand Forks is given in Table IV-1. A graph of these floods is given on Figure IV-1.

Table IV-1 - Ten Highest Floods In Order of Magnitude
Red River of the North at Grand Forks

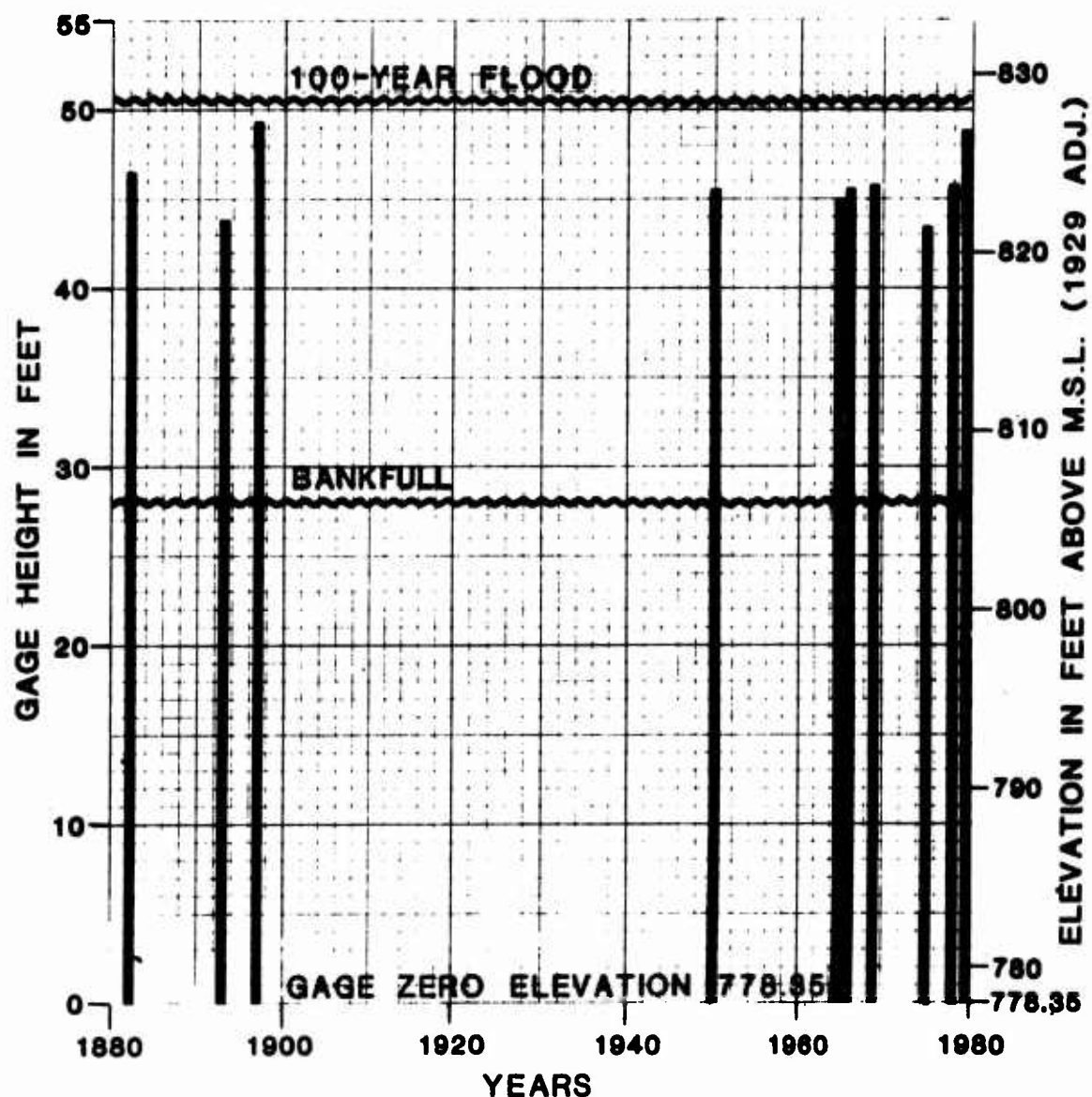
Order No.	Date of Crest	Gage Heights		Estimated Peak Discharge cfs
		Stage Feet	Elevation ^{1/} Feet	
1	April 10, 1897	49.3	827.65	85,000
2	April 26, 1979	48.81	827.16	82,000
3	April 18, 1882	46.3	824.65	75,000
4	April 4, 1966	45.55	823.90	55,000
5	April 11, 1978	45.73	824.08	54,200
6	May 12, 1950	45.5	823.85	54,000
7	April 16, 1969	45.69	824.04	53,500
8	April 24, 1893	43.8	822.15	53,300
9	April 17, 1965	44.92	823.27	52,000
10	April 24, 1975	43.27	821.62	45,000

^{1/}Gage Zero = 778.35 (1929 adj.)

Flooding begins at a Red River of the North stage of about 28 feet (Elev. 806.35), with appreciable flood damage starting in the city park areas at a stage of about 35 feet. Significant flood damages to structures and building contents begin at a stage of about 40 feet with seepage into basements in the downtown business district. At a 47-foot stage, the Grand Forks water treatment plant is inoperative, requiring emergency supplies from East Grand Forks. At a 49-foot stage, the Northern States Power plant is shut down. The maximum flood of record at Grand Forks occurred in 1897 with a stage of 49.3 feet, a peak discharge of 85,000 cfs, and a corresponding expected return interval of once in about 62 years. The 1-percent chance flood based on presently accepted frequency-discharge relationships* would have a maximum stage height of 50.4 feet and a corresponding discharge of 89,000 cfs. A list of water surface elevations by river mile for the 100-, 50-, and 25-year flood frequencies is given in Table IV-2.

* Revised frequency-discharge relationships for Red River of the North flood plains are presently being reviewed by interested regional, State, and Federal agencies. Revised stage and discharge data and water surface profiles for the above selected frequencies will be incorporated into this manual when the revised basic relationships are approved.

FIGURE IV-1



TEN HIGHEST FLOODS OF RECORD
RED RIVER OF THE NORTH
AT GRAND FORKS - EAST GRAND FORKS

Table IV-2 - Grand Forks-East Grand Forks
Water Surface Elevations*¹

River Mile	100-year flood		50-year flood		25-year flood	
	Elevation	Stage	Elevation	Stage	Elevation	Stage
294.26 (Mouth of English Coulee)	828.7		826.3		823.4	
295.0	828.9		826.5		824.3	
295.5 (Downstream Limit of Riverside Park)	829.0		826.6		824.5	
295.7 (USGS Gage)	829.0	50.65	826.8	48.45	824.5	46.15
296.0	829.0		826.8		824.5	
296.5	829.5		827.2		824.9	
296.9 (Upstream Limit of Riverside Park Reach)	829.7		827.4		825.1	
297.0	830.1		827.8		825.3	
297.5	830.4		828.1		825.6	
297.6 (Upstream Side - BN Br.)	830.6		828.4		825.8	
298.0	831.4		829.2		826.4	
298.1 (Upstream Side - Mn. Ave. Br.) (Downstream Limit of Central Park)	831.4		829.2		826.4	
298.5	831.6		829.3		826.6	
298.6 (Upstream Limit of Central Park)	831.6		829.4		826.6	
298.8 (Downstream Limit of Lincoln Park)	831.7		829.4		826.7	
299.0	831.7		829.4		826.7	
299.5	831.9		829.6		826.8	
300.0	832.2		829.8		827.0	
300.1 (Upstream Limit of Lincoln Park)	832.2		829.9		827.1	
300.5	832.3		830.0		827.2	
301.0	832.5		830.1		827.3	
301.5	832.7		830.3		827.5	
302.0	832.9		830.5		827.7	
302.3 (Mouth of Belmont Coulee)	833.0		830.6		827.8	
302.5	833.1		830.6		827.8	
303.0	833.2		830.8		828.0	

* Based on accepted frequency-discharge data.

Water surface elevations for all flood frequencies will be increased when new frequency-discharge data presently under agency review is approved.

¹ Water surface elevations for any location and for other flood frequencies can be approximated by applying difference in stage reading at USGS gage. Example: Given forecasted stage of 49.55, what is elevation at mouth of Belmont Coulee? Solution: 49.55 is 1.1/2.2 of difference between 48.45 (50-year) and 50.65 (100-year). Multiplying this factor by difference of 2.4' (833.0 - 830.6) at mouth of coulee gives 1.2'. Adding to 830.6 gives approximate water surface elevation of 831.8.

WATER SURFACE PROFILES

Water surface profiles for past and projected flood levels have been developed for both the Red River of the North and English Coulee. These profiles are used in determining required flood barrier heights, areas to be evacuated, and required sewer closure measures. Profiles for the 10-, 50-, and 100-year floods and the standard project flood for the Red River of the North based on accepted frequency-discharge relationships* are shown on Plate IV-1. Historical water surface profiles for the Red River of the North are shown on Plate IV-2. Similar profiles for English Coulee from the mouth to 32nd Avenue South are shown on Plate IV-3.

FLOOD OUTLINES

The approximate flooded area outline for the 100-year flood for the Red River of the North and English Coulee floodplains are shown on Plate IV-4. This outline shows those areas that would be affected by a 100-year flood. If a 100-year flood stage is forecast, local flood fight personnel can quickly determine those areas which would be flooded or threatened with flooding in the event of levee failure or overtopping.

SEWER BACKUP

Backup of floodwaters through sewers into basements always has been and will continue to be a severe problem in addition to surface flooding problems. A map delineating areas served by the various sanitary sewer lift stations is shown on Plate IV-5. A similar map delineating areas served by the various stormwater lift stations is shown on Plate IV-6. A list of floodwater elevations at which each of the lift stations is rendered inoperative or require emergency protective measures is given in Table IV-3.

* Revised frequency-discharge relationship presently under review by interested State and Federal agencies will result in increased water surface elevations for any given flood frequency.

Table IV-3 - Minimum Floodwater Elevations at which Sanitary
and Stormwater Lift Stations Become Inoperable or
Require Emergency Protective Measures

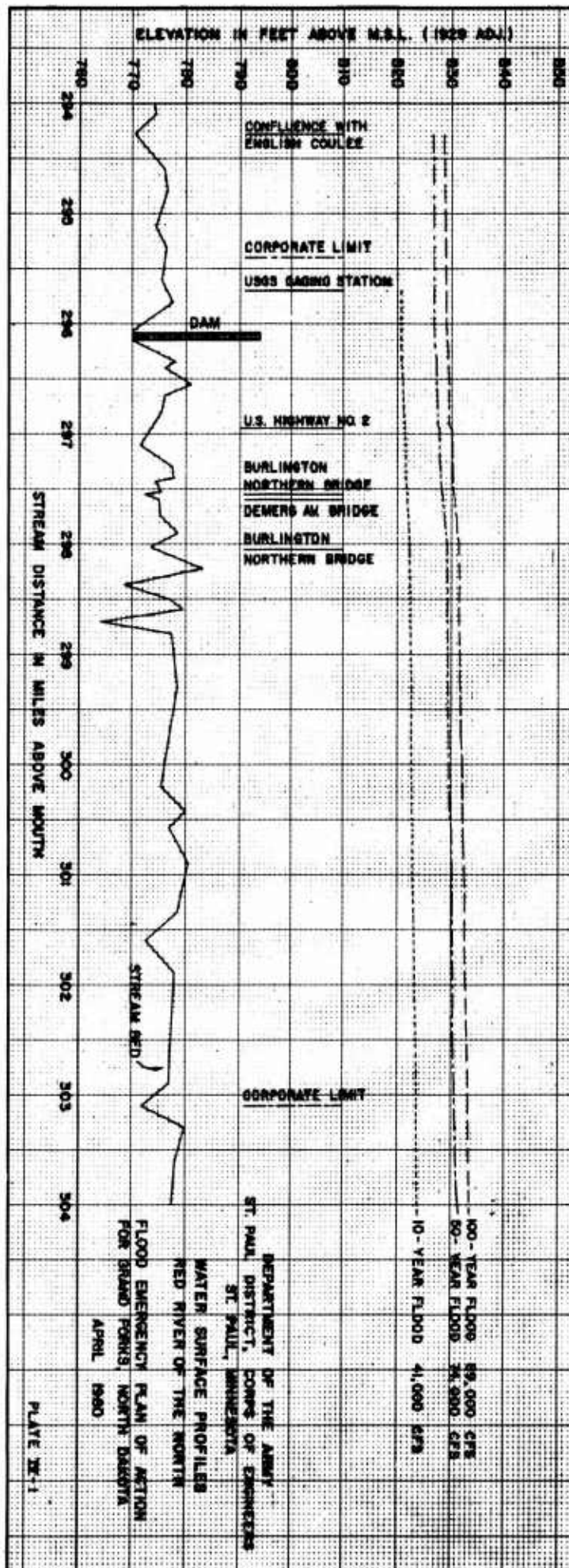
<u>Sanitary Lift Sta- tion No. (Service Area No.)*</u>	<u>Minimum Controlling Floodwater Elevation</u>	<u>Corresponding** Gage Reading at USGS Gage</u>	<u>Stormwater Lift Sta- tion No._I</u>	<u>Minimum Controlling Floodwater Elevation</u>	<u>Corresponding** Gage Reading at USGS Gage</u>
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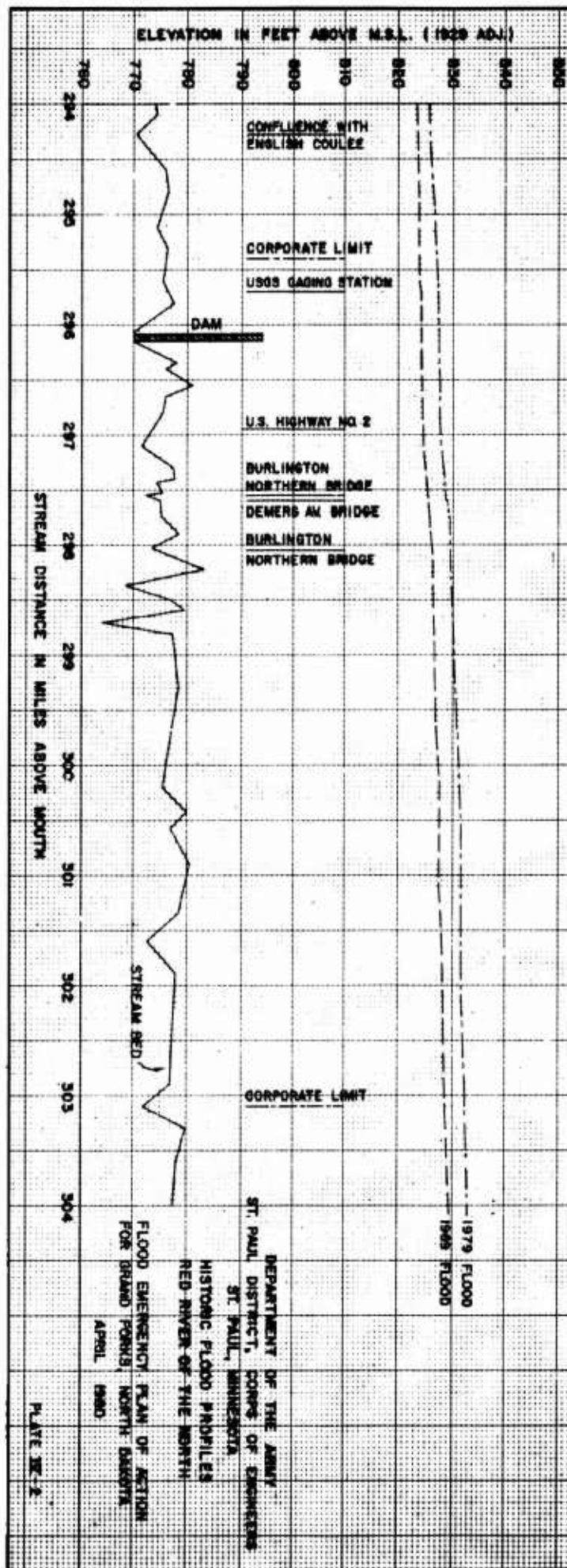
(To be completed by city as data become available)

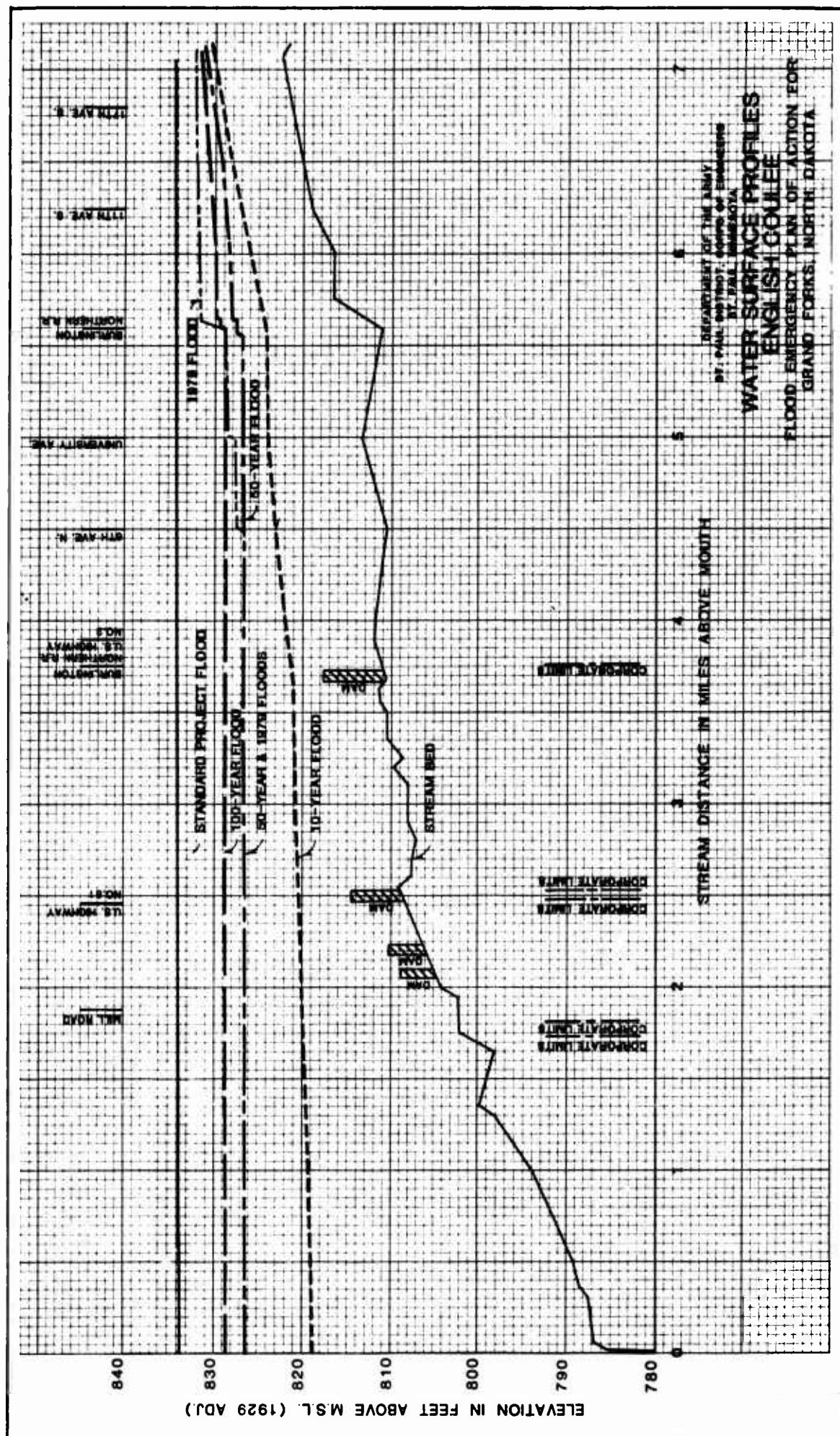
**Not applicable for lift stations located
in English Coulee

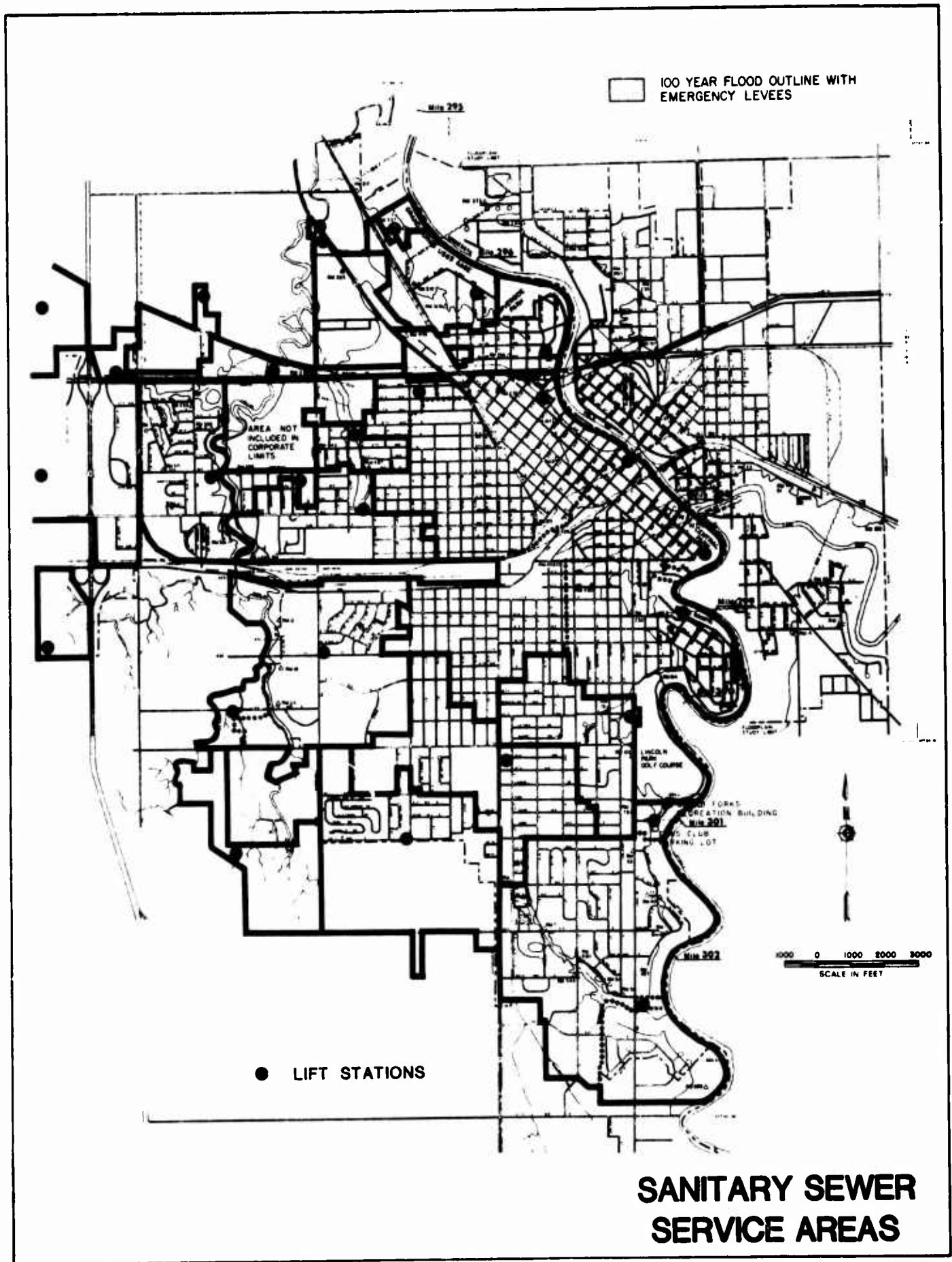
* See Plate IV-5

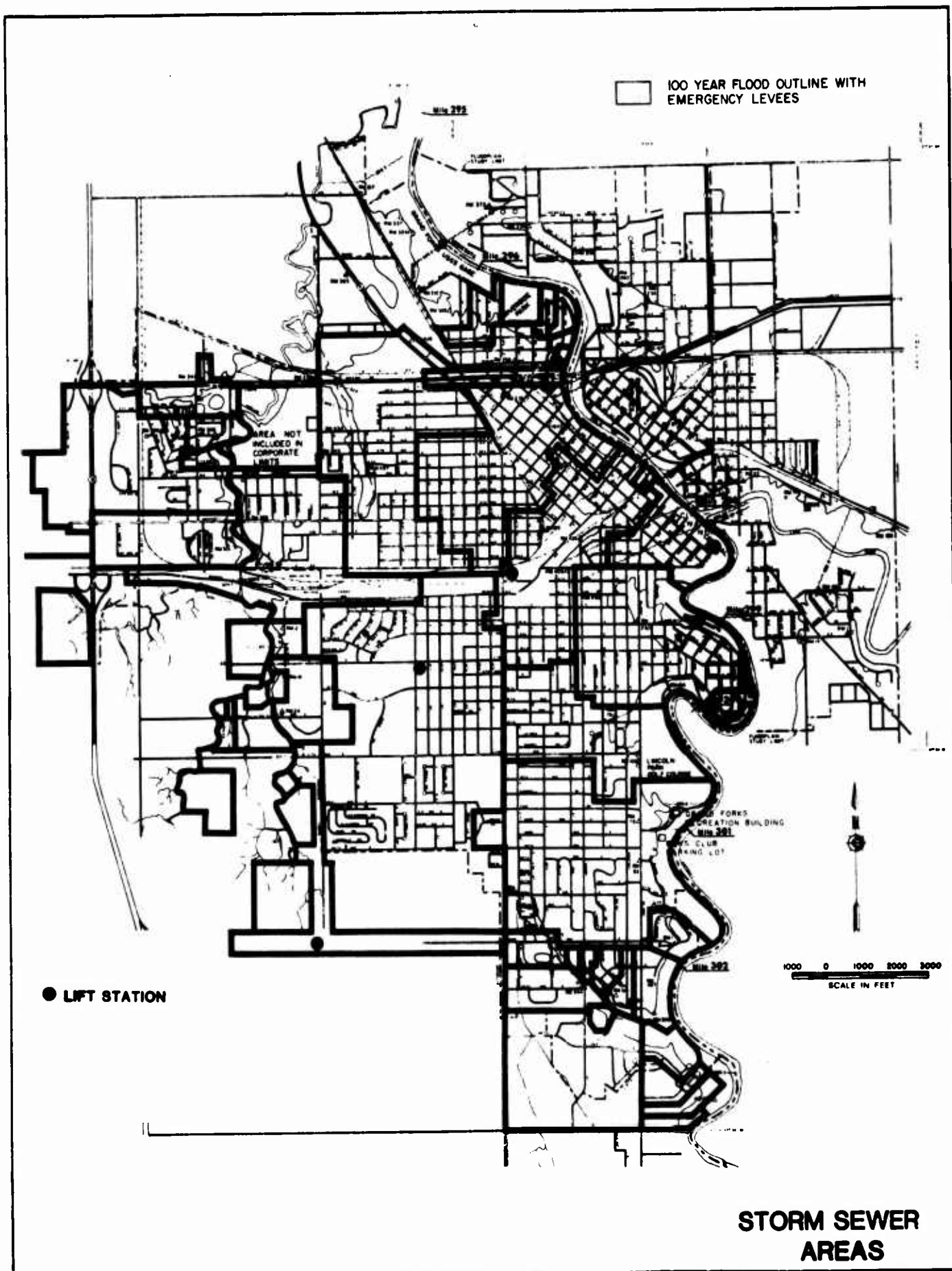
_I See Plate IV-6











100 YEAR FLOOD OUTLINE WITH
EMERGENCY LEVEES

AREA NOT
INCLUDED IN
CORPORATE
LIMITS

RECREATION BUILDING
CLUB
PARKING LOT

● LIFT STATION

1000 0 1000 2000 3000
SCALE IN FEET

STORM SEWER
AREAS

PLATE IV-6

Grand Forks
Flood Emergency Plan of Action

Chapter V

EXISTING FLOOD CONTROL FACILITIES

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Chapter V

EXISTING FLOOD CONTROL FACILITIES

GENERAL

Permanent and emergency flood control barriers are in place at Grand Forks. These include the federally-constructed Lincoln Park levee and floodwall project and the Riverside Park and Central Park emergency flood barriers. Other works include local culvert closures on Columbia Road just north of U.S. Highway 2 and the South 30th Street road raise (with sewer closures) between 11th and 14th Avenues South. The locations and extent of these flood barriers are shown on Plate V-1.

LINCOLN PARK LEVEE AND FLOODWALL

The Lincoln Park levee and floodwall was constructed by the Corps of Engineers in 1963 and includes a 5160-foot levee and 770-foot floodwall. The levee has a 10-foot top width, 1 vertical on 2.5 horizontal (1 on 2.5) riverward side slope and a 1 on 2.5 landward side slope. Present (April 1980) levee top elevations range from 831.8 at the downstream end to 832.0 at the upstream end. The floodwall has an average top elevation of about 832.5. The levee and floodwall protect against a flood having a recurrence interval of once in about 50 years with 2 feet of freeboard or once in about 30 years with 3 feet of freeboard. A typical cross section through the levee is shown on Plate V-2. A profile of the top of levee and floodwall is shown on Plate V-3. To remove interior runoff behind the floor barrier and seepage through the levee, the project includes a 21,720-gallon-per minute pumping station.

RIVERSIDE PARK EMERGENCY LEVEE

The Riverside Park flood barrier includes a combined levee and floodwall extending northward from the area of Seward Avenue and Riverside Drive, a distance of about 3450 feet, to the vicinity of North 2nd Street and

Park Avenue. This emergency levee has an 8-foot top width, riverward side slopes varying from 1 on 2 to 1 on 3, and landward side slopes varying from 1 on 3 to 1 on 4. The levee top elevation ranges from 826.4 at the upstream end to 824.7 at the downstream end. A 650-foot timber and plank floodwall with an average top elevation of about 825.4 feet runs along the top of the levee between the upstream end and midway between Fenton and Conklin Avenues extended beyond the homes on the east side of Riverside Drive. Two openings, one at Lewis Boulevard and Park Avenue and the other at 1st Street and Park Avenue, require temporary closures during flood emergencies.

Assuming no failure of the barrier, this levee and floodwall with the two closures in place protect against a flood having a recurrence interval of about once in 10 years with 3 feet of freeboard. A section of this barrier near its upstream end is subject to sliding and subsidence as a result of poor foundation conditions. Seepage through this section of the barrier is a problem. This seepage and backup through a sewer caused flooding behind the barrier during the April 1979 flood and required construction of a backup levee along Riverside Drive. Four homes flooded by the sewer backup were subsequently purchased by the city and removed to permit construction of an earthen levee along an alignment through this area. This new levee replaces the timber floodwall that was located in the backyards of these homes. A typical cross section of the levee and floodwall is shown on Plate V-2. A profile of the top of levee and floodwall is shown on Plate V-4.

CENTRAL PARK EMERGENCY LEVEE

The Central Park flood barrier extends 1500 feet from Minnesota Avenue southward to a point on the riverbank just south of Elm Street extended. This levee has a top width of about 10 feet, side slopes of 1 on 3, and a maximum height of about 10 feet. The levee, together with a

closure across Minnesota Avenue and a temporary sandbag or earthen barrier at the park entrance, protects against a 33-year flood with 3 feet of freeboard. A typical cross section through the levee is given on Plate V-2. A profile of the top of levee is given on Plate V-4.

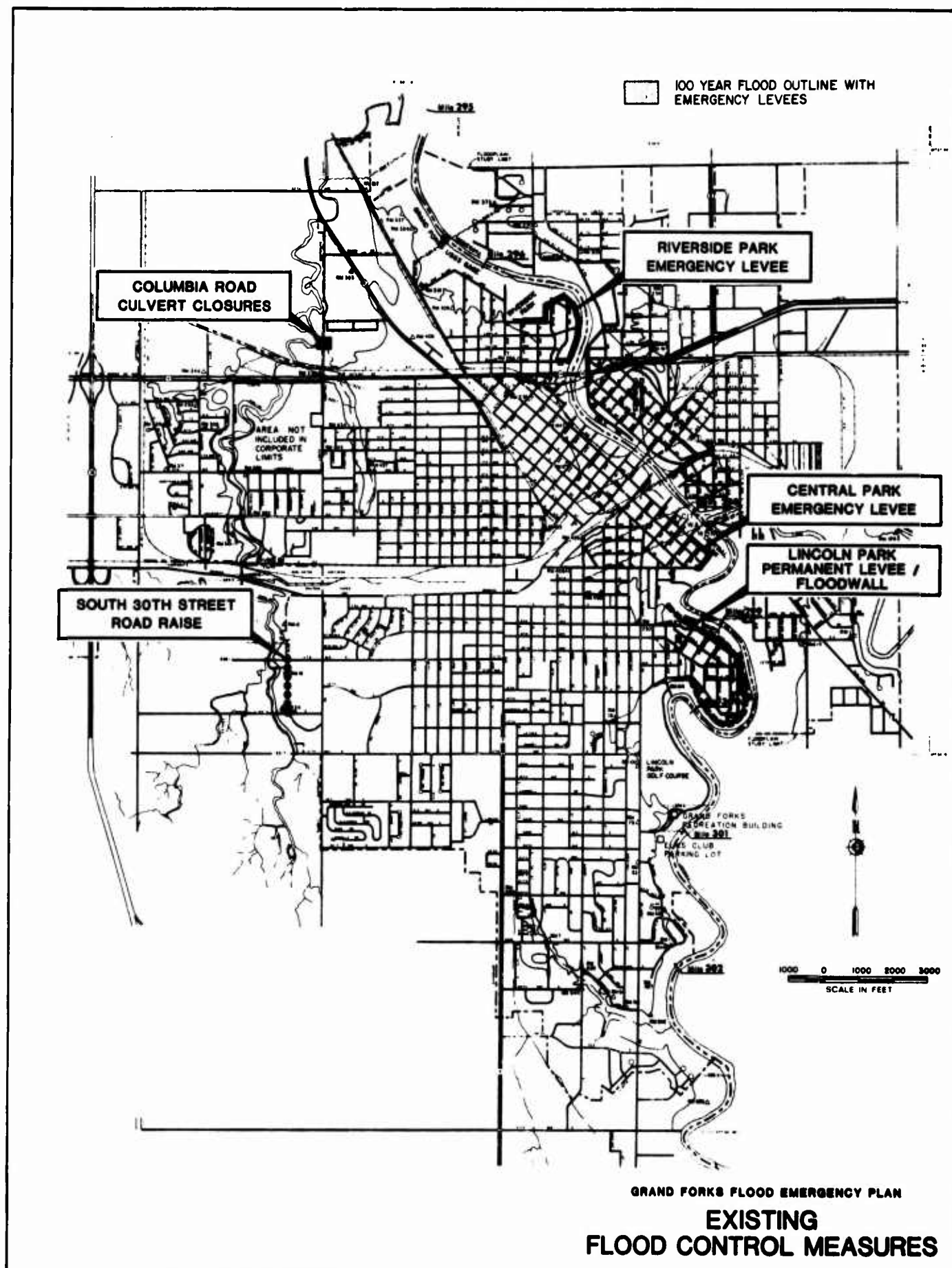
TOPOGRAPHIC REFERENCE DATA

Substantial topographic elevation reference data are available to determine existing flood barrier heights and required flood barrier raises. These data include known elevations of established bench marks (fire hydrants, etc.), tops of curbs, and approximate street intersection elevations (at the nearest manhole cover). A list of selected reference elevation points is given by river reach in Table V-1. All elevations are referenced to the 1929 datum as adjusted.

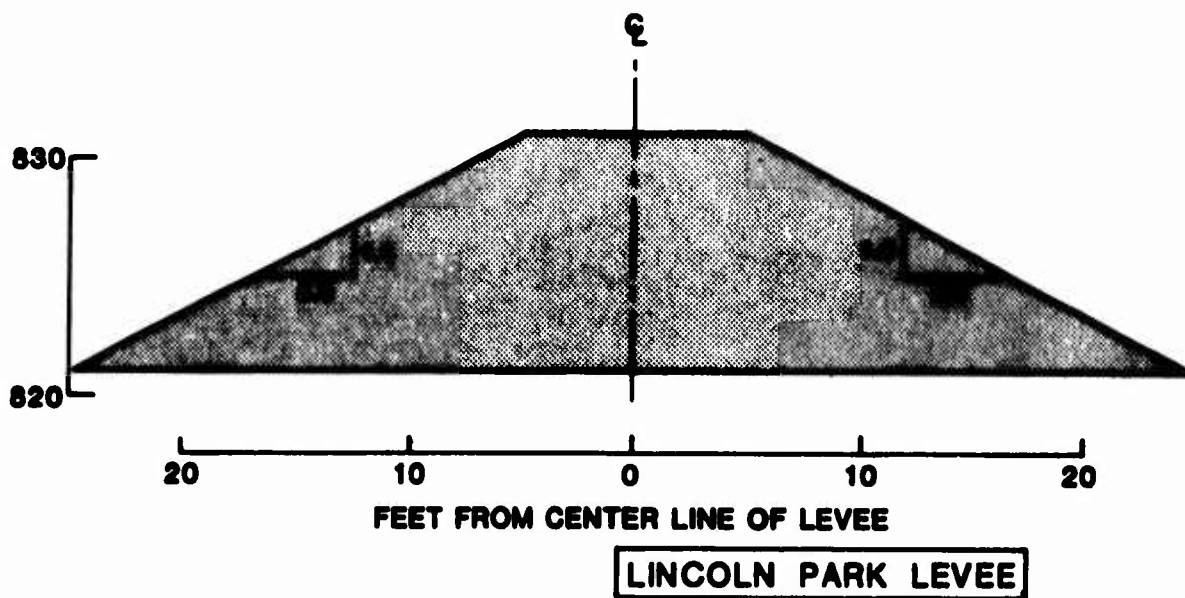
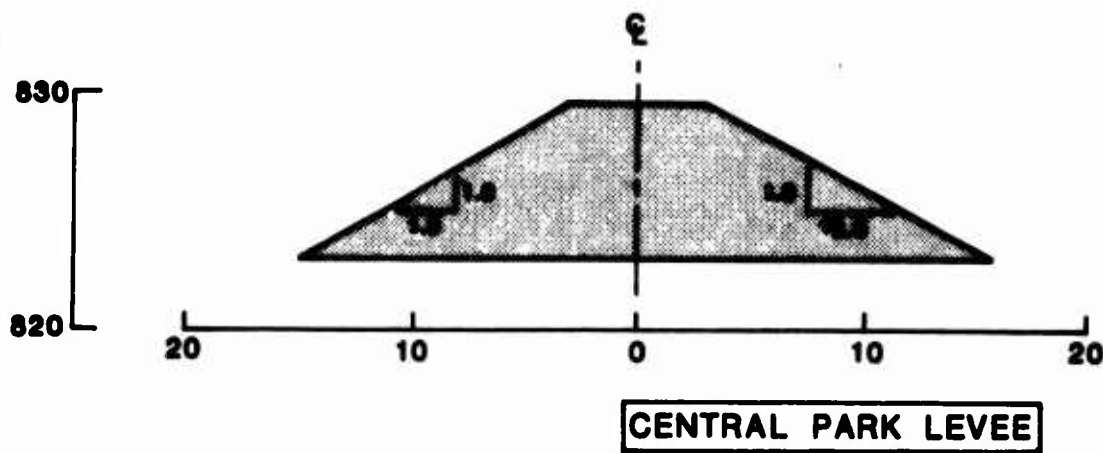
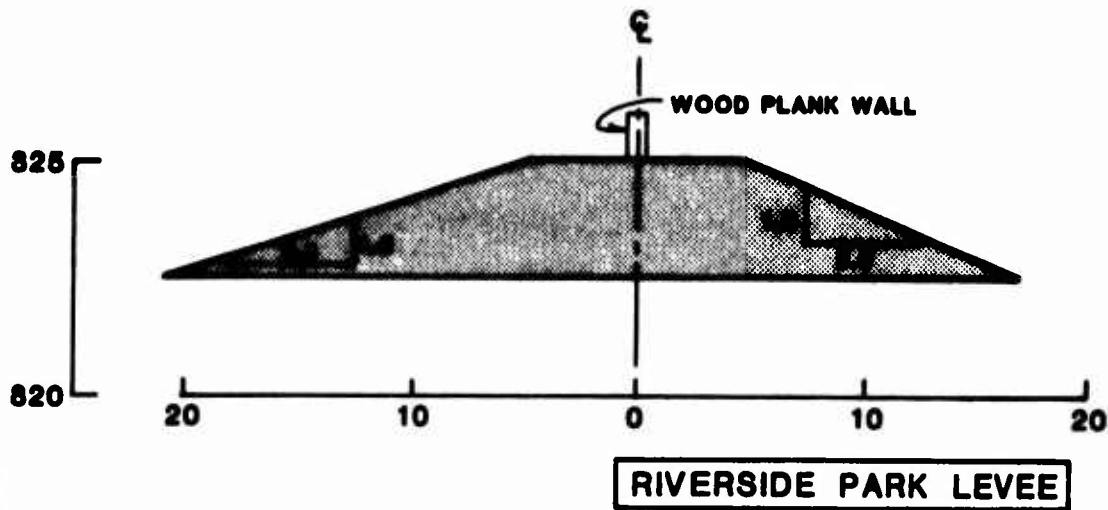
Table V-1 - Selected Elevation Reference Points

<u>Location</u>	<u>Elevation (1929 adj.)</u>	
	<u>Street Intersection</u>	<u>Hydrant (Top Nut)</u>
<u>Riverside Park</u>		
Alpha and North 6th Street	828.0	
Park and North 4th Street	829.6	
Park and North 3rd Street	828.5	831.5
Park and North 2nd Street	826.7	
Park and North 1st Street	821.8	826.3
Park and Lewis Boulevard	820.2	824.2
Conklin and Lewis Boulevard	826.7	829.7 N of Conklin 831.1 S of Conklin 830.3
Fenton and Lewis Boulevard	827.2	
Seward and Lewis Boulevard	827.8	
Conklin and Riverside Drive	827.5	
Fenton and Riverside Drive	826.1	
Seward and Riverside Drive	828.6	
U.S. Hwy 2 underpass at Lewis Boulevard	821.3	
U.S. Hwy 2 overpass at Lewis Boulevard	839.4	
3rd Street and 8th Avenue North	830.0	
3rd Street and 6th Avenue North	829.0	

<u>Location (continued)</u>	<u>Elevation (1929 adj.)</u>	
	<u>Street Intersection</u>	<u>Hydrant (Top Nut)</u>
<u>Lincoln Park</u>		
Reeves Drive and 4th Avenue South	830.3	
Reeves Drive and 6th Avenue South extended	830.9	
Reeves Drive and 8th Avenue South	831.5	
Belmont Road and 8th Avenue South	831.7	
Almonte Avenue and 8th Avenue South	830.9	
Belmont Road and 10th Avenue South	831.7	
Reeves Drive and 10th Avenue South	831.5	
Almonte Avenue and 10th Avenue South	831.9	
Belmont Road and 11th Avenue South	832.5	
Reeves Drive and 11th Avenue South	832.0	
Midway Reeves Drive and Almonte and 11th Avenue South	831.6	
Belmont Road and 13th Avenue South	831.5	836.3
Belmont Road and 15th Avenue South	827.0	
Belmont Road and 17th Avenue South	830.0	
Lincoln Drive and Almonte Avenue	835.5	
Lincoln Drive and Lanark Avenue	815.2	
Lincoln Drive and Pakenham Avenue	821.7	
Lincoln Drive and Euclid Avenue	827.3	
Chestnut Street and 15th Avenue South	831.9	
Chestnut Street and 17th Avenue South	836.1	
Park Drive and Belmont Road	837.94	
<u>Central Park</u>		
North 3rd Street and 6th Avenue North	829.0	832.1
North 3rd Street and University	829.7	
North 3rd Street and 1st Avenue North	829.7	
North 3rd Street and Kittson	830.4	832.7
North 3rd Street and Division	830.5	834.0
North 3rd Street and Minnesota	825.0	
North 3rd Street and Woodland Avenue		824.0
North 3rd Street and Elm Avenue		824.6

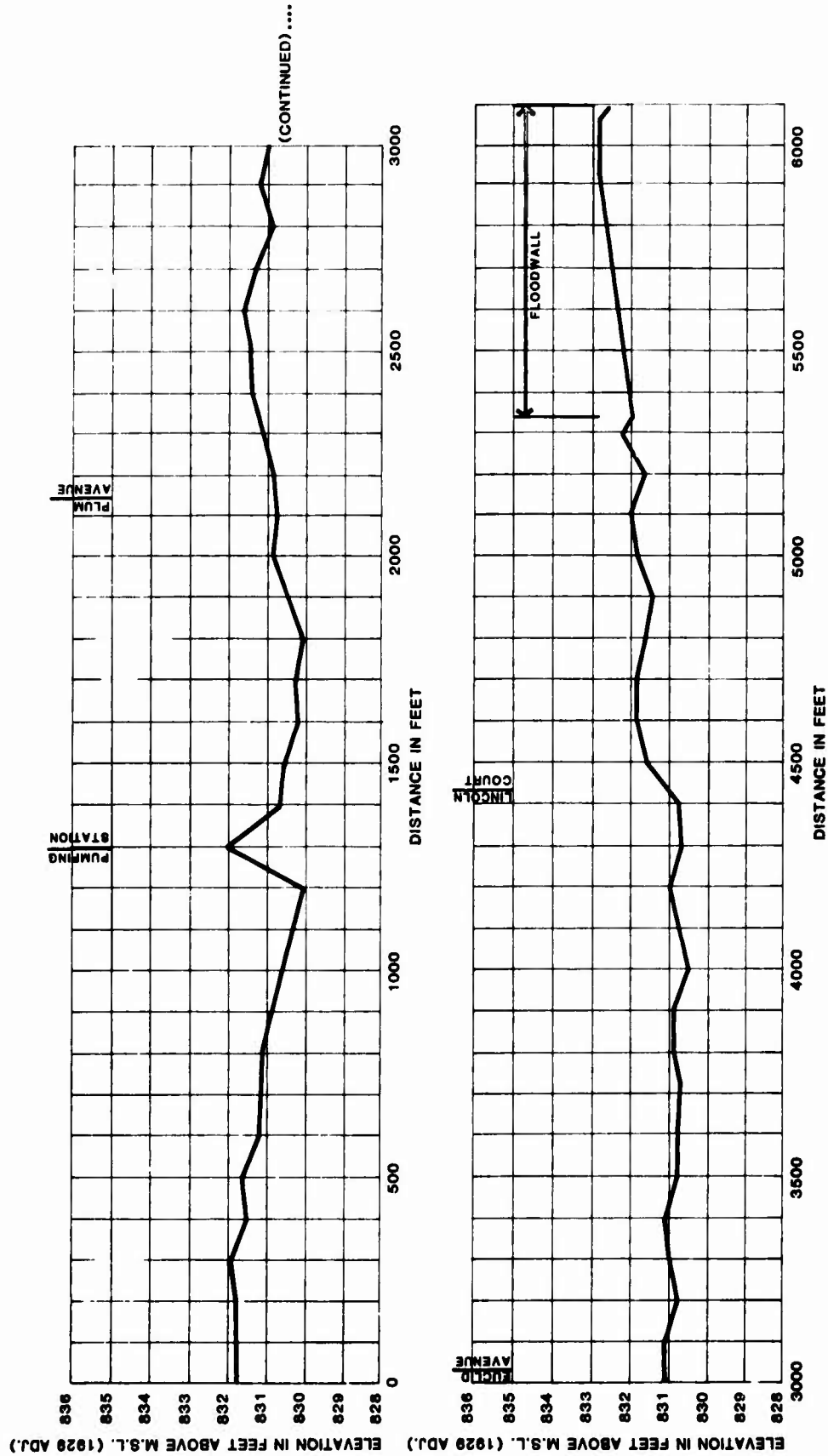


ELEVATION IN FEET ABOVE M.S.L. (ADJ. 1929)



GRAND FORKS FLOOD EMERGENCY PLAN

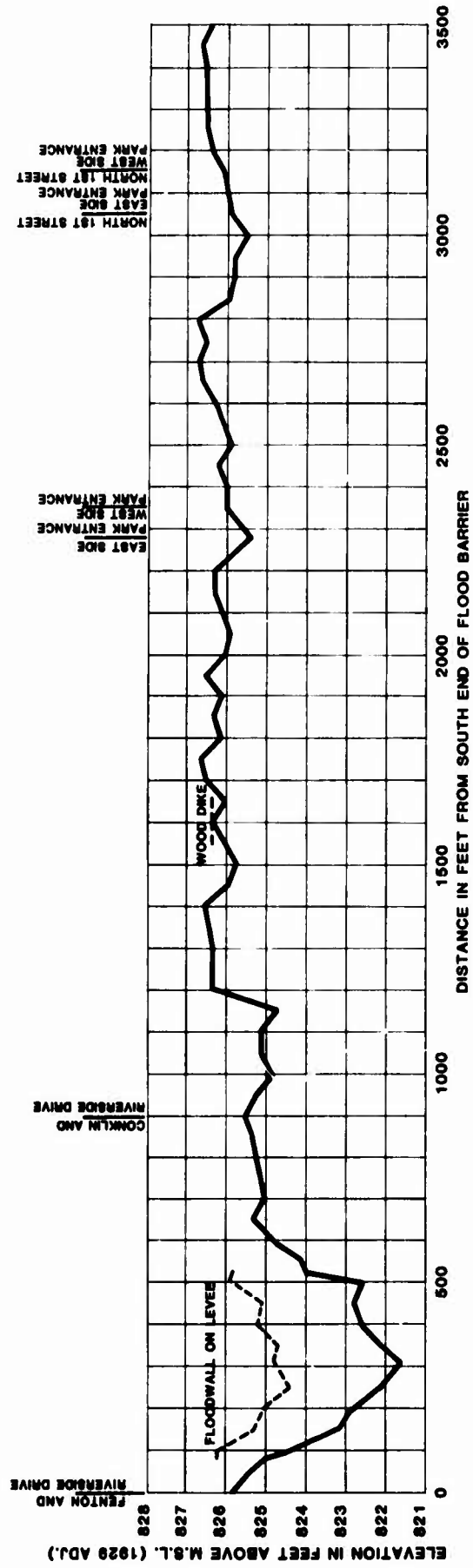
TYPICAL LEVEE CROSS SECTIONS



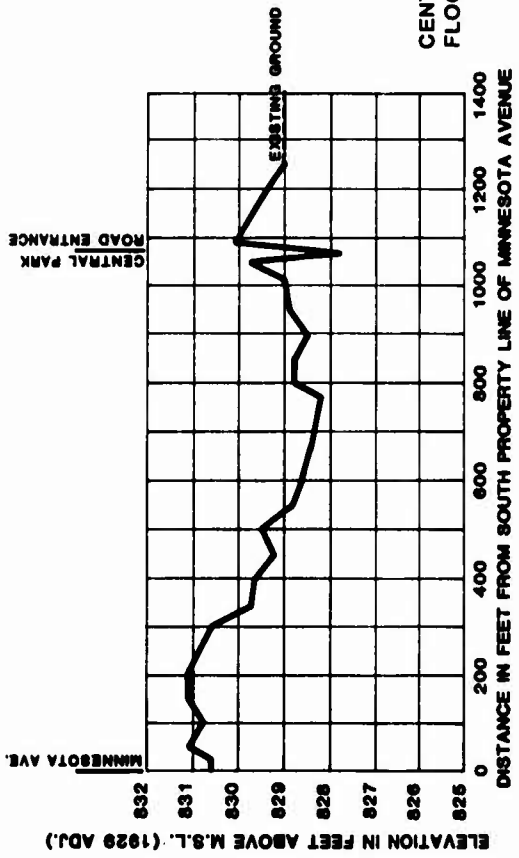
GRAND FORKS FLOOD EMERGENCY PLAN
LINCOLN PARK
FLOOD BARRIER PROFILE

NOTE: SEE COMMENT ON PAGE VIII-1

LINCOLN PARK FLOOD BARRIER PROFILE



RIVERSIDE PARK
FLOOD BARRIER PROFILE



CENTRAL PARK
FLOOD BARRIER PROFILE

NOTE: SEE COMMENT ON PAGE VII-1

GRAND FORKS FLOOD EMERGENCY PLAN
RIVERSIDE AND CENTRAL PARKS
FLOOD BARRIER PROFILES

Grand Forks
Flood Emergency Plan of Action

Chapter VI

EMERGENCY OPERATIONS CENTER

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CHAPTER VI

EMERGENCY OPERATIONS CENTER

PURPOSE

The primary purpose of the Emergency Operations Center is to furnish a central location and facilities for control, coordination, and communications during the flood fight. The total effort involves several city departments; public, private, and semiprivate organizations; and hundreds of volunteers. The various control systems that serve each individual group during normal times will not automatically lend themselves to centralized operations during a major emergency. A new form of organization is required to make the best possible use of the abundant talent, spirit, and resources of the community during a flood fight. The backbone of that organization is the EOC.

LOCATION

During a flood emergency, the EOC will be located in the basement of the City Police Building. The EOC will consist of two rooms separated by a movable partition. One room will serve as a command post/communications center; the other will be used for meetings and conferences. The meeting rooms include kitchen facilities and vending machines. A third room, the Police Department squad room, is separated from the meeting room by movable partitions. Permission must be granted by the Chief of Police or his designee to use this room.

FACILITIES AND EQUIPMENT

Prior to activation, the EOC will be provided with office equipment and supplies to meet anticipated staffing needs and an extended period of operation. These items include the following as a minimum:

Furniture:

Desks and chairs
Work tables
File cabinets and folders
Map easels

Other:

Paper and other writing supplies
Blackboards
Bulletin boards
Data log books
Data registration cards
Sewer service area directory
Telephone directory

Communications:

Radios
Telephones (4 minimum)

Life vests
Portable radios
Armbands
Hardhats
Flashlights

The following minimum basic data will be available in the EOC:

Map of existing and possible flood barrier alignments
River Stage - Required Emergency Action Matrix
Water surface profiles - RRN and English Coulee
Map of storm sewer service areas
Map of sanitary sewer service areas
Map of combined sewer areas
Flood area outlines
Top of levee and floodwall profiles (see Chapter 5)
Required fill-volume profiles (see Chapter 8)
Forecasted stage versus flood level table
Evacuation areas with levee failure or overtopping
Emergency evacuation routes
Locations of emergency housing facilities
River level recording charts
Mobile Command Post operation boundaries
Dike Patrol maps

These maps and charts should be placed either on wall bulletin boards, easels, or other support to permit instant access and inspection so that the EOC staff can quickly respond to any emergency. Additional communication facilities are located in the Police Department, the county Civil Defense Director's office located across the hall from the EOC, and in the North Dakota Disaster Emergency Services' radio van. The EOC commander is responsible for adequate communications facilities.

Of the four telephones in the EOC, three - 775-3809, 775-3831, and 775-3832 - are released to the public through the media. The remaining number - 746-5948 - is reserved for official incoming calls and released only to persons and organizations involved in the flood fight.

IMPLEMENTATION OF EOC

Establishment of the EOC is determined by the Civil Preparedness Director in coordination with the Mayor and Director of Public Works. The timing and extent of EOC operations depends on the forecasted severity and timing of flood crests at Grand Forks. (See next chapter for criteria for instituting and emergency flood fight.)

The EOC is activated in stages by the Civil Preparedness Director. It is continuously manned during the flood emergency and deactivated by the Civil Preparedness Director when the danger has passed. The EOC Commander keeps the number of personnel in the command post/communications center to the minimum necessary to maintain coordination, control, and communications. All other personnel stationed in the EOC take positions in the meeting room. An illustration of the interrelationships between the EOC and elements of the Public Works Department is shown on Figure VI-1.

Staffing - Initial staff in the EOC consists of the EOC Commander, personnel to operate the communications equipment under the projected message load, and a resource person from the Public Works Department office if needed.

If conditions warrant, the staff may be increased to include more communications personnel; clerical assistance; messengers; and representatives from the media, Red Cross, Salvation Army, Civil Air Patrol, National Guard, etc. In most cases, telephone communication with these groups will be adequate and will cut down the noise and confusion that would be caused by additional people in the EOC.

Operation - While it will probably be impossible to achieve prior EOC coordination before all field decisions are made, the EOC should be notified of new developments as soon as possible, particularly when these developments involve or affect the public. All flood fight field leaders should keep the EOC fully informed so that maximum coordination can be obtained and accurate information can be disseminated to the public in a timely manner.

Public Information and Staff Meetings - During a flood fight, accurate and current information must be released to the public in a timely manner. Subject to the nature of the flood situation and to the level of interest shown by the media, the following schedule of public information releases and staff conferences applies:

8:00 a.m. (0800 hrs) The off-going EOC Commander will brief the media in attendance on important events since the previous press conference and be available for a short question and answer period.

5:00 p.m. (1700 hrs) A staff meeting shall be held, attended by political leaders if they desire, department heads, and leaders of organizations involved in the flood fight. Authorized representatives may be sent instead. The primary purpose of this staff meeting is to reinforce coordination and control; it should also provide valuable input for the public information conference held immediately afterwards.

Approximately 6:00 p.m. (1800 hrs) This public information conference should be attended by the Mayor if available, the Director of Public Works, Civil Preparedness Director, and other department heads and/or representatives as needed and available. The media should be briefed on matters of general public interest, followed by a short question and answer period.

While this procedure cannot be expected to stop all rumors, it should furnish ample opportunity for the public to get the facts from those having access to accurate information.

The staff meetings and the press conferences shall be held in the EOC meeting room.

EOC COMMUNICATIONS

General - The first steps taken by the EOC Commander to establish the EOC communications system will include:

- (1) Notify the Chief of Police to hook up the radio remotes.
- (2) Order the telephone company to hook up the telephones.
- (3) Publicize the three flood information telephone numbers discussed earlier.
- (4) Notify the media of the EOC activation and the news conference schedule.

Telephone - A request from the EOC Commander to NW Bell is required to energize EOC telephone numbers 775-3809, 775-3831, and 775-3832. The telephones are stored in Dr. Sondreal's storage area near the EOC. The primary use is for incoming calls from the public. They will be manned by city/county employees as needed.

Telephone number XXX-XXXX must also be put in service at the request of the EOC Commander. The primary use of this number is for both incoming and outgoing calls between the EOC and official and semi-official

persons and groups involved in the floodfight. Do NOT release this number to the public. (Authorized persons may get the number from the EOC.)

Police telephone -- 772-7171 -- is the permanently energized wall-mounted unit. As this telephone is wired through the Police Dept. switchboard, use of this unit should be kept to a minimum to avoid clogging the Police Department system.

The NW Bell telephone number for commercial installation service is 775-1818. Fast service should be requested if necessary. All telephones are capable of handling both incoming and outgoing calls.

NW Bell has designated one of its employees, a Mr. Pat Hopman (telephone 775-1222, home 746-6102) to study our telephone communications system. Possible improvements contemplated include rotating number keyed-type telephones in the EOC so that all incoming calls can be handled from one instrument. This would also allow us to release only one number to the public. The installation of telephones at various locations on the levee and at the Armory sandbag lot is also under consideration.

Radios - The following two-way radios will be remoted from bases currently existing in the City Police Building:

KUL 704 (Receive on 154.710 and Transmit on 155.565) - This is the City Police Department's primary channel. MCP's furnished by the Police Dept. can be reached on this channel if KAB 623 is inoperative.

KAB 623 (155.130) - This is the Secondary City Police channel. It will be monitored by the Mobile Command Posts and scanned by the Director of Public Works or his designate. The United Hospital, UND Police, and EGF Police also monitor this channel.

KGY 210 (154.175) - City Fire Dept. channel. Boat crews and basement flooding crews can be reached on this channel. The MCP furnished by the Fire Dept. can also be reached on this channel if KAB 623 is inoperative.

KAU 201 - City Public Works channel. Due to the excessively high traffic on this channel, this remote will not be hooked up unless KAB 623 is inadequate or inoperative.

The following radios are not remotes, but have independent communications capability:

DES Channel 4 (154.085) - It is envisioned that the State Disaster Emergency Services (DES) or State Radio network will provide portable units on this frequency. Some of these portable units will be issued to the neighborhood dike patrol organizations listed elsewhere in this manual (see Chapter VIII). At the present time, the city does not own any other radio equipment on this frequency; however, this radio can be used as a communications link to the UND EOC, the Grand Forks AFB, and the Civil Air Patrol (CAP), if they are in the area.

Amateur (HAM) Radio capability will be supplied on request to Mr. Norm Pedersen, 775-8656, who is the emergency services coordinator for the HAM Club. The club will also supply one operator on a permanent basis while the EOC is in operation. This operator will serve as the EOC Communications Officer. HAM Radio is an auxiliary system, and may be expanded as necessary to include mobiles and portables, if available. Advice and assistance on all EOC Communications systems should be sought from the Communications Officer on duty as the need arises.

Citizens Band (CB) radio capability can also be utilized in emergencies; however, due to the less structured CB system, the various radio facilities listed above would probably better serve

our purposes. A decision on utilizing a CB system will be based on the results of a conference between the Communications Officer and the Civil Preparedness Coordinator after the EOC is activated.

CB'ers to call:	home	work
Dwayne Luessenheide	775-5940	777-2127
John Hanson	772-8978	772-2266
*Ben Stienman	772-5388	

*For EOC equipment and installation

Grand Forks City Police Department - The following radio and other communication facilities are utilized by the City Police Dept.:

KUL 704	155.565 154.710 155.475	Contact with all Grand Forks Police units and contact with U.N.D. Security
KAB 623	155.130	Contact with all Grand Forks Police units East Grand Forks Police Ambulance City electrician Pager system
KAU 201	155.925	Street maintenance and engineers; city electrician
KGY 210	154.175	Fire Department
KDU 576	155.040	Civil Defense units
State Radio KAD 798		Ch. 1 Sheriff's units Ch. 2 Highway Patrol Ch. 3 Point to point
C.B. Radio		Monitored on Channel 9
Telephone Hot Lines		Police Department to Airport Police Department to News Media Police Department to other ND cities, State Radio, and weather stations.

OTHER

Teletype
G.F. Cable T.V. hook up.
Civil Defense sirens

State Radio Trailer Communication Facilities - The State Radio Trailer contains the following communication equipment which may be available for use during a flood emergency:

- 2 Base Stations
- 1 Repeater
- 1 Teletype
- 4 Telephone Systems
- 1 Wireless Telephone
- 1 C.B.
- 1 Ham
- 1 Medical radio system for Hospital and Ambulance contact 154.340
- 37 Portable radios 155.340

The above is the disaster system which is also known as a Supplementary System as it can be operated separately from the State radio system leaving the State radio system available for normal police communications.

The State radio trailer also contains two portable base stations which can be moved to other locations and which have the capability to be powered by a 12-volt battery. These can be operated either on or off the State system and can be used by either law enforcement or disaster assistance personnel.

Three Law Enforcement Channels can be utilized during a flood emergency and include:

- 1. 155.430 Receive - 154.935
- 2. 155.505 Receive - 154.905
- 3. 155.475 National Emergency

State Disaster 154.085

North Dakota Highway Department 156.030 - Aircraft

Miscellaneous Communications - The Fire Department can release two (2) personal paging units which should probably be issued to the Mayor and the Director of Public Works or the City Engineer on duty at that time. The Fire Department can also furnish chargers - extra batteries are available from Stone's Mobile Radio @ \$6.50 apiece. It is recommended that batteries be rotated at least every twelve (12) hours. The encoders must remain in the Fire Department's Central Station, so that any pages will originate from there. Richard Aulich may also be paged from that location. If needed, the Police Department may possibly release another pager or two.

KNOX Radio has been designated as the official commercial flood emergency station. They currently have broadcast capability from the EOC meeting room. Their services may be used by the EOC as needed.

There is also a radio on the county net frequency in Dr. Sondreal's office. This unit may be used as required.

There is cable TV interrupt capability and a "hot line" to the media in the Police communications center. These facilities are for emergency use only.

The U.S. Coast Guard also has a complete mobile communications center similar to State Radio. If available, this unit may be requested and utilized. For assistance call Lt. Cmdr. Steven Hungness at 1-612-725-7452 or after hours call 1-612-459-6031.

The Corps of Engineers, U.S. Coast Guard, American Red Cross, East Grand Forks Flood Control Dietrich Bus Co., and other groups will have their own radio communications systems. It will be necessary to contact their various base stations by telephone if needed.

EOC Communications Logs - Every effort should be made to have all significant telephone and radio communications logged on forms or pads that will be provided for that purpose. In this way, a record of flood fighting operations can be maintained. This record may well prove to be of great value during postflood recovery and for critiques, training, and a basis for manual revision.

Radio Maintenance Service - There is a radio maintenance contract currently in effect with Stones Mobile Radio Service. Since Mr. Stones is very familiar with the Police Building communications system, he will be called for service at 772-6691, or after hours at 543-3952 or 746-9261.

EOC Communications Operators - The following city and county personnel will be available for duty as EOC communication equipment operators during a flood emergency:

<u>Name</u>	<u>Office Phone</u>	<u>Office</u>
ELLEN LOEING	775-2571	County Auditor
LAVAUGHN LEBLANC	775-2571	County Auditor
JONI PAYTON	775-2571	County Auditor
VIVIAN SEIM	775-2571	District Court
DONNA FETCH	775-2571	District Court
CINDY LARSON	775-2571	County Court
INA WIGEN	775-2571	County Court
JEAN SKAVLLEM	775-2571	County Court
HARRIET OLAFSON	772-8171	County Social Services
LUELLA WENTSEL	772-8171	County Social Services
BETTE HANSEN	772-8171	County Social Services
DARLYS MCQUAY	772-8171	County Social Services
LINDA WYSOCKI	775-8103	City Data Processing
CONNIE BARTA	775-8103	City Data Processing
RONI BOHLMAN	775-8103	City Planning
City Auditor will designate one person	775-8103	Auditing

MOBILE COMMAND POSTS

Mobile Command Posts (MCP's) are phased in by the EOC Commander as needed. They serve as the "eyes and ears" of the EOC in the field. A maximum of three vehicles and drivers shall be available - two from the Police Department and one from the Fire Department. KAB 623 is the assigned radio channel for these vehicles.

While MCP's can be used for any purpose in any geographical area at the discretion of the EOC Commander, the following information is furnished as a guide (see Figure VI-2):

1. The North MCP could cover the Red River north of the Point Bridge (Minnesota Avenue), the northern reaches (north of Mill Road) of the English Coulee, plus any other sector of activity in the north section of the city.
2. The South MCP could cover the Red River south of the Point Bridge, including Belmont Coulee and any other sector of activity in the south section of the city.
3. The West MCP could cover the English Coulee and any other sector of activity in the west area of the city.
4. Major duties of the MCP's include:
 - A. Confirming requests for manpower, food, supplies, and equipment from the field and guiding the requested assistance if necessary.
 - B. Making sure an engineer is actually needed when requested.
 - C. Furnishing liaison with the Dike Patrol.
 - D. Verifying miscellaneous field reports.
 - E. Providing communication, courier, and delivery services.
 - F. Checking trouble spots.
 - G. Serving as field decision makers at a level between the EOC Commander and a volunteer work crew.

EOC PURCHASES

It is understood that the EOC will, of necessity, become involved in the purchasing, ordering and leasing of supplies and equipment. It is very important that good records be kept of these transactions to prevent spurious billings appearing after the emergency has passed and to aid in recovery proceedings. The timetable below may help the EOC Commanders in developing a proper purchasing procedure.

1. River at 28 ft. gauge (flood stage) - The EOC will be activated on an 8 hour per day, or less, basis. The EOC radios will be energized and tested. Maps will be checked, floodfight plans reviewed, and supplies inventoried. NW Bell will be notified to stand by for possible hook-up of the EOC phones. Neighborhood organizations will be contacted. Depending on the projected flood crest, the Corps of Engineers, ND DES, State Radio, the American Red Cross, Salvation Army, and other groups expected to be involved in the floodfight will be contacted. No expenses are foreseen at this flood stage.
2. If necessary, EOC supplies such as office supplies, life jackets, reflective vests, flashlights and batteries, etc., will be purchased utilizing funds appropriated under the Civil Preparedness Budget. All purchase orders will be signed by the Civil Preparedness Coordinator.
3. If the projected crest warrants, a declaration of emergency shall be sought by the Civil Preparedness Coordinator from the Mayor. If the Mayor declares an emergency, the sand/sandbag fund - \$100,000 - shall become available for these purchases. In addition, the City Auditor shall be directed by the Mayor to set up an emergency account to handle the purchase and/or lease of other equipment and supplies from appropriate vendors.

4. It is important that all charges to the emergency account originating from the EOC be properly supported by EOC records, such as the EOC Commander's log or the communications logs. All slips and/or invoices shall be initialed or signed by the person receiving the merchandise and expressly approved by the EOC Commander. The EOC Commander shall also ensure, to the best of his ability, that everything ordered was necessary and justified, was purchased at a reasonable price, and was actually received. The EOC Commander shall presume, unless otherwise proven, that all sand and sandbags are being used to protect public property and that therefore these purchases are legitimate expenditures of public funds.

EOC SECURITY OPERATIONS

General - Realizing that floods, natural disasters, or other emergency situations may necessitate the restriction of movement of vehicles and people in affected areas because of rescue operations, fire department operations, flood barrier construction, clearing of damaged areas, and security patrols to prevent looting or other criminal activity, the city of Grand Forks has developed a security pass system. To administer this system, the city has been divided into four separate areas for which personal and vehicle identification passes of different color have been developed as described below.

AREA A - is that area north of the Burlington Northern tracks and west of North Washington Street and is designated by personal and vehicle identification passes that are WHITE in color.

AREA B - is that area north of the Burlington Northern railroad tracks and east of North Washington Street and is designated by personal and vehicle identification passes that are YELLOW in color.

AREA C - is that area south of the Burlington Northern railroad tracks and west of South Washington Street and is designated by personal and vehicle identification passes that are ORANGE in color.

AREA D - is that area south of the Burlington Northern railroad tracks and east of South Washington Street and is designated by personal and vehicle identification passes that are GREEN in color.

All personal and vehicle identification passes, other than official passes, are designated by the large C.D. Pass D.P. The initials designate Civil Defense Pass and Disaster Preparedness. A sample of this pass is shown on Figure IX-3 of Chapter IX. A sample disaster area pass application form is shown on Figure IX-2.

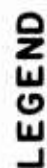
Pass Identification - Official personal identification passes are WHITE in color bordered by YELLOW and bearing the blue and red Civil Defense logo. The official Vehicle Pass identification is a white card printed in BLUE bearing the Civil Defense logo and stating Civil Defense Emergency Vehicle and a blank space for writing in the number of the vehicle.

All personal identification will be worn clipped to the front of the shirt or jacket. All vehicle identification passes will be attached to the lower left front windshield.

All personal, vehicle and official identification passes will be issued at a location to be designated and announced by the Grand Forks Disaster Emergency Services Director. It shall be the responsibility of the Police Department and other law enforcement agencies or organizations assisting the Grand Forks Police Department to enforce the pass restrictions and to enforce the ordinances and statutes of the State of North

Dakota with regard to criminal activity and looting in any area affected during natural or man-made disasters. It shall be the further responsibility of the Police Department to handle the issuance and control of both the vehicle passes and the personal passes at the designated location.

COE



R.C. RADIO COMMUNICATION
D.T.C. DIRECT TELEPHONE COMMUNICATION
E.C.V. ENGINEER COMMAND VEHICLE
E.T.A. ENGINEER TECHNICAL ASSISTANCE
24 HOUR OPERATION

FIGURE VI-1

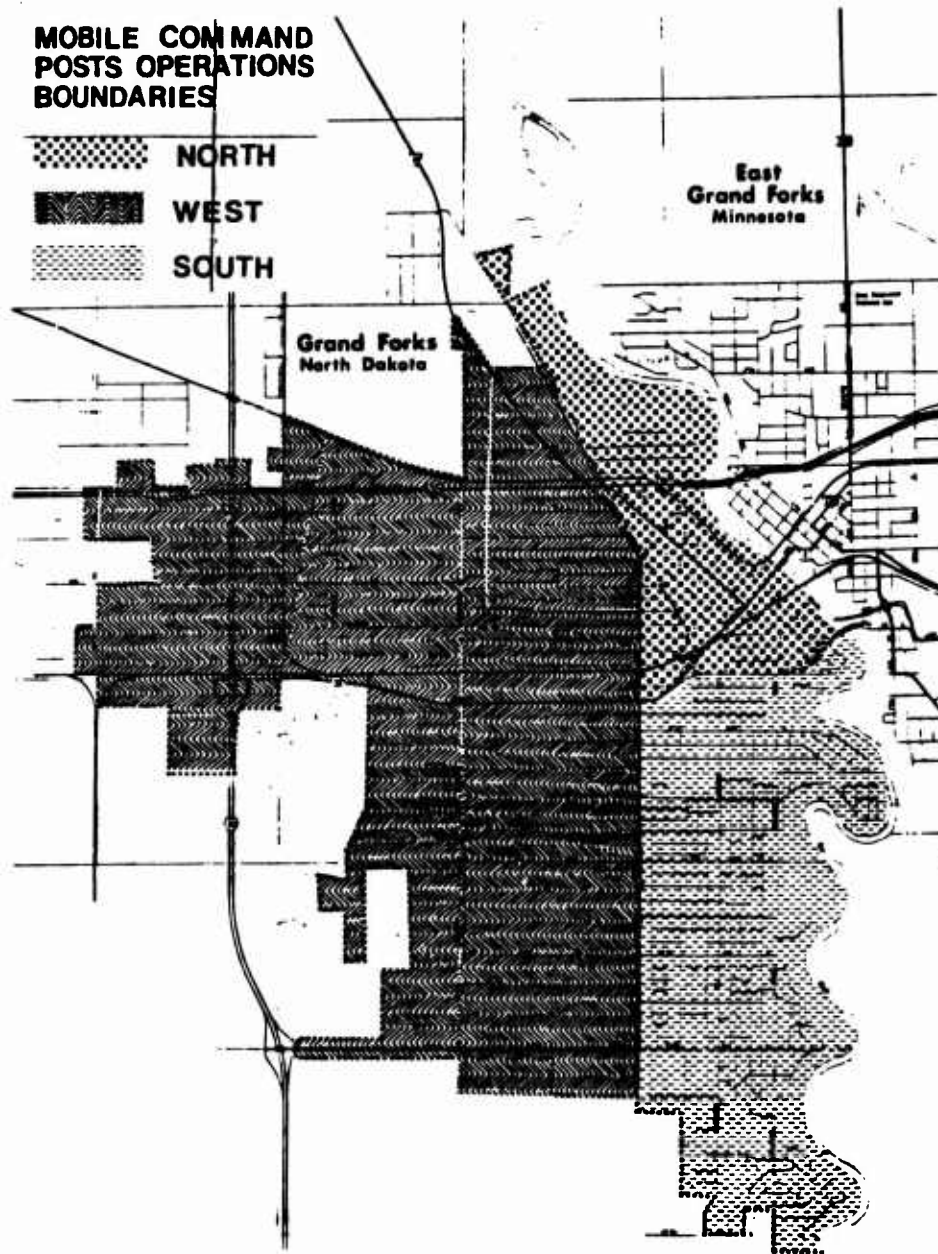


FIGURE VI-2

Grand Forks
Flood Emergency Plan of Action

Chapter VII

IMPLEMENTATION
OF
EMERGENCY PLAN

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Chapter VII IMPLEMENTATION OF EMERGENCY PLAN

PREFLOOD PREPARATIONS

General

This chapter describes the activities and preparation required to initiate a successful emergency flood fight. Preflood planning; inspections; and the availability of adequate materials, equipment, and personnel have a direct bearing on the ultimate effort required in a major flood fight. This chapter also covers the staged procedure which initiates various levels of flood fight activity. Adhering to a staged procedure will generally prevent major commitments of local resources to an expected flood fight that does not materialize.

Preflood Education Program

Well before any flood emergency arises, preferably in late winter or early spring, the city should inform floodplain residents of measures that they can take to reduce potential flood damages and of the importance of flood forecasts and warnings. Typical measures local residents should be advised of before and after a flood include:

When warned of impending flooding -

- . Listen to your radio for emergency instructions
- . Watch for rapidly rising floodwaters
- . Fill large containers with tap water for drinking, cooking, etc.
- . Secure outdoor items that might be washed away
- . Move household belongings to upper levels
- . Prepare for shutting off of utilities

- . Check readiness of vehicles for evacuation
- . If you must evacuate, do so quickly and safely
- . Beware of water-covered roads and bridges

After the flood -

- . Reenter buildings with caution
- . Be alert for fire hazards such as piles of wet hay or feed, gas or oil leaks, broken electrical wires, etc.
- . Do not use appliances or equipment until they have been cleaned, dried, and checked for damage
- . Examine food and water supplies for floodwater contamination
- . Spread clothing, furniture, feed, hay, and other supplies so they can dry thoroughly
- . Do not "sightsee" in disaster areas

Flood Insurance - The flood insurance program established by the National Flood Insurance Act of 1968 makes available specified amounts of flood insurance previously unavailable from private insurers. The act requires that local governments adopt and enforce land use controls and other regulatory measures that will guide development in flood-prone areas to avoid or reduce future flood damages.

The 1973 Flood Insurance Act requires that all buildings in the special flood hazard areas (100-year floodplain) of a participating community be covered by flood insurance to be eligible for any form of assistance or guarantees from a federally insured or supervised bank or savings and loan association or from any Federal agency. An October 1977 amendment to the program removed the restrictions on eligibility for mortgages from federally insured lending institutions for those communities not participating in the program. However, if a community does not participate in the program, property owners may be denied Federal flood disaster assistance funds.

Grand Forks has complied with the requirements for eligibility in the regular program, and flood insurance is available for residential and commercial structures and contents at actuarial rates. As of 30 April 1980, 1258 policies were in effect of which 1104 were on single-family dwellings. Total insurance coverage was \$29,188,900.

The 100-year floodplain along the Red River of the North at Grand Forks is generally classified as an A-20 flood insurance rate zone with scattered small areas of B zone (between 100- and 500-year flood levels) in the business district. The English Coulee floodplain includes A and A-11 zones downstream to the Burlington Northern railroad crossing just north of U.S. Highway 2 and an A-16 zone from this point downstream to the mouth. Local residents can contact City Hall to determine the zone in which they are located. Flood insurance can be obtained in maximum coverage amounts of \$185,000 and \$200,000 for residential and commercial property, respectively. Annual premium rates under the regular program for flood insurance rate zones at Grand Forks are tabulated as follows:

<u>Rate Zone</u>	<u>Residential</u> ^{1/}	<u>Commercial</u> ^{1/}
A	20¢/100 + \$15 ^{2/}	40¢/100
A-11	25¢/100 + 35¢/100c ^{3/}	40¢/100 + 75¢/100c
A-16	Same as A-11	Same as A-11
A-20	Same as A-11	Same as A-11
B	15¢/100 + 40¢/100c + \$15	25¢/100 + 60¢/100c

^{1/} For a \$35,000 maximum coverage, 1-story building with basement

^{2/} Expense constant

^{3/} 25¢/100 + 35¢/100c = 25¢ per \$100 value of building + 35¢ per \$100 value of contents.

A very important qualification concerning the acquisition of flood insurance is that policies will not cover damages caused by a loss in progress. A loss in progress is defined as a situation in which flood damage to a structure or its contents started before the policy takes effect. In Grand Forks, there is a five-day waiting period before a flood insurance policy takes effect.

Flood Proofing - Although flood proofing can reduce flood damages, particularly in the case of industrial or large commercial structures, problems may limit its practicality and desirability. Frame structures, for instance, seldom have sufficient soundness to allow flood proofing. Costs may prove excessive and could prove to be a deterrent to use.

Flood proofed structures may encourage residents to stay rather than evacuate. This could be hazardous if access to the structure is lost during a flood; a rapid rise of floodwater may preclude safe evacuation. Persons who attempt to gain access to these structures may be subjected to serious hazards. Floodwater velocities over 3 feet per second at depths greater than 2 feet are considered dangerous for pedestrian travel. In general, any structure not more than 100 feet within the 100-year flood outline and/or having a first floor elevation not more than 2 feet below the 100-year surface elevation may be considered for flood proofing.

Flood proofed structures are not immune from flood damage. Faulty materials and/or improper design, installation, or construction of flood proofing measures may result in failure of the structure. Floods of a magnitude greater than the design flood may exceed the capabilities of the flood proofing measures. Thus, careful and thorough consideration must be given to the design and construction of flood proofed structures and to flood proofing measures retrofitted to existing structures.

Although most simply and economically applied to new construction, flood proofing may be used with existing development. Individual

residences can be flood proofed by installing a drain field; sealing low-level window, door, and other openings; installing flood drain standpipes and check valves; and sealing and filling walkout basement entrances. Commercial and industrial structures can be flood proofed by placing fixed or movable bulkheads across low-level window, door, and utility openings; waterproofing masonry walls where practical; and eliminating depressed loading ramps.

All flood proofed structures, including those elevated on fill, should be evacuated during all major floods to insure the health and safety of the occupants. Plates VII-1 through VII-5 show acceptable flood proofing methods and techniques. These measures require considerable construction time and expense. Since conditions just before a spring flood may not be suitable for construction work, they should be constructed well in advance of the spring flood season. Reference should be made to "Floodproofing Regulations" published by the Corps of Engineers, June 1972, for standards for design and construction of flood proofing methods. This publication is available in the City Planner's office in City Hall.

Emergency Flood Fighting and Sandbagging - Emergency flood fight and disaster relief efforts have been generally successful at Grand Forks. However, a much expanded flood fight and disaster relief effort would have to be instituted to cope with a 100-year flood, which would crest 1.5 feet higher than the April 1979 flood.

When predicted flood levels are not expected to be greater than 3 feet around affected structures and would not preclude safe exit from the structures, temporary sandbag barriers may effectively be used to prevent flooding. Sandbags generally may be purchased from the city during a flood, with sand fill provided free by the city at strategic neighborhood locations. The proper methods and techniques for using sandbags to raise existing flood barriers or to protect individual structures are shown on Plates VII-6 and VII-7.

Flood Warning and Forecasting Services - It is very important that area residents thoroughly understand the purpose and meaning of flood forecasts and flood warnings from the National Weather Service.

Forecasting services for the Grand Forks area cover flash floods and major flood forecasts. Flash flood warnings are issued by the Fargo Weather Service office if rainfall with flooding potential is reported or if there is at least an 80-percent chance that flash flooding will occur. Time limitations for these flash floods probably would not permit construction of emergency works, but may permit evacuation of residents and movable property.

Flash flooding may result in major problems along English Coulee; but flooding of the RRN is not of the flash flood type. Major floods on the Red River of the North usually occur in early spring as a result of melting of heavy snow cover combined with warm rains. Lead time between snowmelt advisory forecasts and the flood crest at Grand Forks may range from 1 to 4 weeks. Lead time during major floods in the past has permitted construction of effective emergency flood barriers. Water levels at locations along the Red River of the North and along English Coulee for a range of gage forecasts are shown in Table VII-1. This table should be provided to local newspapers a few weeks in advance of the spring flood season.

Training Needs - Training of selected volunteers in proper methods of sandbag filling and placement, wood floodwall construction, use of portable emergency communications equipment, and Dike Patrol inspection procedures should be done before the spring flood season. This training would be the responsibility of the Civil Preparedness Director with assistance from key experienced flood fight personnel. For most volunteers, this would be an annual "refresher" course. Expert technical advice for this training session is available from the city's Public Works and Fire Departments; the State Disaster Emergency Services Office

Table VII-1 - NEIGHBORHOOD WATER LEVELS
FOR VARIOUS GAGE FORECASTS^{1/}

FORECAST STAGE (AT U.S.G.S. GAGE)	WATER LEVELS - RRN Elevation - MSL (1929 ADJ)			WATER LEVELS - ENGLISH COULEE ^{2/} Elevation - MSL (1929 ADJ)		
	Riverside Park	DeMers Bridge	Central Park	Lincoln Park	Mill Road	U.S. Hwy. No. 2 University Avenue 11th Ave. South
42.35 (10-Hr)	821.0	821.8	822.3	822.5	819.9	821.5
45.73 (1978)	824.4	825.3	825.9	826.5	824.6	-
48.45 (50-Yr)	827.2	828.4	829.3	829.6	826.3	826.6
48.81 (1979)	827.5	828.9	829.9	830.7	826.1	826.4
50.65 (100-Yr)	829.5	830.6	831.6	831.9	829.0	829.0

Elevation of Existing Flood Barriers	825	829	831
--	-----	-----	-----

^{1/} USGS gage at river mile 295.7. Subtract 778.35 from given elevations to get stage. Elevations rounded to nearest tenth of a foot. Interpolations between measured water levels for past floods; computer simulated water levels for hypothetical floods.

^{2/} Values shown reflect both Red River of the North backup and coulee runoff.

in Bismarck and the St. Paul District, Corps of Engineers.

At least two individuals from each neighborhood would be trained in sandbag filling and placement techniques. Placement techniques would cover raises of existing levees, barriers around structures, ring dikes around manholes, etc. Selected individuals, preferably with general carpentry experience, would be trained in wooden floodwall construction requirements and practices. Volunteer dike patrollers would be instructed in what to look for - such as cracks or levee subsidence, seepage, piping (flow of muddy water), erosion - and how to estimate the rate of floodwater rise to evaluate the possibility of overtopping. They would also be instructed in methods for controlling unauthorized entry on the flood barriers and proper use of portable radios including standard CB "language."

Material Inventory and Stockpiling

Sandbags and Polyethylene - The acquisition and storage of sandbags and polyethylene is the responsibility of the Public Works Department. Normally sandbags and "poly" will be stored in the Water Works Building. When a major forecasted flood - flood level in excess of a 46-foot stage at the USGS gage - is imminent, access to the sandbag storage area in the water treatment plant is threatened. Thus, for predicted stages exceeding 46 feet (1.5' water on temporary 3rd Street dikes), sandbags and "poly" will be stored at the parking area south of the Armory and north of the BN tracks. During a flood emergency, these supplies will be trucked to the central sandbagging center at the Armory parking lot (see Chapter VIII) as needed.

For an imminent flood emergency and at the request of the city, the Corps of Engineers will under Public Law 99 authority furnish sandbags and "poly" for general public use. Local and regional suppliers of sandbags are listed in Table VII-2.

Table VII-2 Private Sandbag Suppliers

FIRST MIDWEST SUPPLY CORP.
2117 Century Avenue Northwest
East Grand Forks, Minnesota
773-3366

100 lb. burlap bags

VALLEY BAG AND SUPPLY CO.
Highway 2 East
East Grand Forks, Minnesota
773-1189

polypropylene only

NORTHWEST BAG CORP.
400 Third Avenue North
Minneapolis, Minnesota 55401
612-379-0305 (Emergency Number 554-3763)

14" x 34" treated burlap
15" x 34" treated burlap

BERG BAG CO.
410 Third Avenue North
Minneapolis, Minnesota 55401
612-332-8845

17" x 30" burlap

MINNEAPOLIS BAG AND BARREL CO.
425 Hennepin Avenue
Upper Midwest Building
Minneapolis, Minnesota 55401
612-332-8845

burlap (used) 17" x 29"

Pallets - It is assumed that a sufficient number of pallets to operate a sandbag transport system will be locally available. In addition to the private firms listed as forklift owners (see Table VII-10), other sources are given in Table VII-3.

Table VII-3 - List of Pallet Suppliers

INTERNATIONAL CO-OP	Gateway Drive	746-6431
MIN-DAK SEED CO.	Highway 81 North	746-7453
AGSCO	Mill Road	775-5325
GRAND FORKS SEED CO.	Highway 81 North	775-8183
GAMBLE ROBINSON	101 North 8th Street	775-6263
DAKOTA SALES CO.	1916 DeMers	775-9541
NODAK SALES CO.	714 North 47th Street	775-5395
WHITE SEAL SALES CO.	1804 Gateway Drive	772-2751
MCKINNON CO., INC.	1002 S. 48th Street	746-7344

Forklifts may also be available from these companies.

Pallets may also be obtained from the Grand Forks Air Force Base, the National Guard, or East Grand Forks Flood Headquarters.

If these sources cannot furnish enough pallets, the Civil Preparedness Director should inform the media and ask for persons or organizations having spare pallets to call in. National Guard or city trucks could be used to pick up the pallets.

If additional pallets are absolutely necessary, new 4' x 4' pallets may be purchased at \$7.50 each from the Pierce Sawmill Co. of Hatton, ND (1-543-3030). Orders require at least one day to fill. They do not deliver.

Sand and Earth Fill - Supplies of sand for sandbagging and earth fill for emergency levee construction are essential for a successful flood fight. Sources of sand and earth fill are given in Table VII-4. The approximate flood stages at which access to these sources becomes threatened are also shown on the table.

Table VII-4 - Sand and Gravel Sources

<u>Supplier</u>	<u>Sand</u>	<u>Gravel</u>	<u>Clay</u>	<u>Rock</u>	<u>Access lost at Stage</u>
BRADSHAW GRAVEL SUPPLY, INC. 728 Red Dot Place 746-7491	x	x		x	(To be completed by city as data become available)
NODAK CONTRACTING Red Dot Place 775-4205 after hours - Dennis Zimmerman 772-9512	x	x		x	
VALLEY CONTRACTING 1501 North Columbia Road 772-5547 after hours - Jim McMenamy 772-9317	x	x	x	x	
KRINGEN EXCAVATION RR #1 775-7150 after hours - Bob Krigen 775-7150	x	x	x	x	
THE YARD BUILDERS 772-7181 after hours - Hiram Thompson 746-4932	x	x			

Lumber and Other Wood Products - Lumber, timbers, and required fasteners may be required for reinforcing or raising (where practical and safe) existing floodwalls. Local suppliers are listed in Table VII-5.

Table VII - 5 - List of Local Lumber Suppliers

<u>Name</u>	<u>Address</u>	<u>Contact Telephone No.</u>
ERICKSON'S LUMBER MART INC.	Highway 2 East Grand Forks	773-1151
IRELAND'S LUMBER YARDS	2600 West DeMers Ave. Grand Forks	775-6233
VALLEY LUMBER COMPANY	1820 Central Ave. N.E. East Grand Forks	773-8444
GARDNER LUMBER COMPANY	1924 Gateway Drive Grand Forks	772-4895
LAMPERT BUILDING CENTER	5700 Gateway Drive Grand Forks	775-4605
LUMBER DEALERS SUPPLY COMPANY	Highway 220 East Grand Forks	773-2497
PLYWOOD MINNESOTA	4325 University Ave. Grand Forks	772-8166
ROBERTSON GAMBLE'S HOME CENTER	1901 32nd Ave. So. Grand Forks	746-6454
SIMONSON LUMBER AND HARDWARE	820 North 3rd Street Grand Forks	775-4292

Pump and Power Sources - Various types of pumps and related power sources are required for the removal of runoff that collects inside flood barriers from rainfall, snowmelt, and seepage through the barriers. An inventory of city-owned pumps and power supplies is given in Table VII-6.

Table VII-6 - Available City-Owned Pumps

Pumps On Hand At Wastewater Plant

NO.	SIZE	MAKE	OWNER	POWER
1	1 1/2"	Const. Mach. Co.	Wastewater	Gas
1	1 1/2"	Const. Mach. Co.	Wastewater	Gas
1	1 1/2"	Const. Mach. Co.	Wastewater	Gas
1	1 1/2"	Const. Mach. Co.	Wastewater	Gas
1	1"	Big John	Wastewater	Elec.
1	1"	Big John	Wastewater	Elec.
1	1"	Big John	Wastewater	Elec.
1	3" S	Black & Decker	Wastewater	Elec.
1	3" S	Black & Decker	Wastewater	Elec.
1	4" S	Black & Decker	Wastewater	Elec.
1	4" S	-	Wastewater	Hvd.
1	1"	Fairbanks Morse	Wastewater	Elec.
1	1"	Fairbanks Morse	Wastewater	Elec.
1	8"	Crisafulli	Wastewater	P. T. O.
1	4"	Gorman Rupp	Wastewater	Gas
1	4"	Rice	Wastewater	Gas
1	3"	Midland	Wastewater	Gas
1	4"	Gorman Rupp	Streets	Gas
1	3"	Gorman Rupp	Streets	Gas
1	3" S	Peabody Barnes	Streets	Elec.
1	3" S	Peabody Barnes	Streets	Elec.
1	1"	Gorman Rupp	Water Rec.	Gas
1	1 1/2"	Const. Mach. Co.	Water Rec.	Gas
1	1 1/2"	Const. Mach. Co.	Water Rec.	Gas
1	1 1/2"	Const. Mach. Co.	Water Rec.	Gas
1	1 1/2"	Const. Mach. Co.	Water Rec.	Gas
1	3"	Self Prime Centrifugal	Water Rec.	Gas
1	6"	Gorman Rupp (no wheels)	Water Rec.	Elec.
1	8" S	Flygt	Wastewater	Elec.
1	2"	Flygt	Water	
1	715265	6" " Gorman Rupp	Wastewater	Gas
1	715267	6" " " "	"	"
1	10070	8" " Crisafulli MH Pump	"	P. T. O.
1	10078	8" " " "	"	"
1	10065	8" " " "	"	"

S - Submersible

In addition to these city-owned pumps and related power sources and pumps available from the Corps of Engineers and other agencies, various types of pumps and power sources may be rented from local suppliers listed below:

Table VII - 7 - Private Pump and Power Sources

<u>Supplier and Type</u>	<u>Contact Telephone No.</u>
ACME ELECTRIC MOTOR, INC.	746-6481
has light duty, medium duty, heavy duty Approximately 200 in stock	Some rental
FORKS ELECTRIC MOTOR AND SUPPLY	746-1361
has all types Approximately 400 in stock	Some rental
NORTH AMERICAN PUMP CORPORATION	772-6022
has all types Supplies easy to obtain	Rental on all pumps
HOBBS	
No water pumps	
NORTHERN PLUMBING SUPPLY	775-3911
only <u>medium</u> duty in stock Small supply	NO rental
MIDWEST PUMP AND SUPPLY	
(Salesmen not in office - call in once a week for messages)	
MIDLAND DIESEL SERVICE & ENGINE COMPANY	
No water pumps	
NORTHERN EQUIPMENT AND SUPPLY CORPORATION	775-4276

A list of private suppliers of tractors with power take-off units (PTO's) needed to run the larger pumps is given in the following table.

Table VII - 8 - Private Suppliers of Tractors with PTO's*

<u>Supplier</u>	<u>Address</u>	<u>Contact Telephone Number</u>
CASE POWER & EQUIPMENT	Highway 81 North	772-4889 After hours: Andy 746-6342 Bob 746-1978
GRAND FORKS IMPLEMENT, INC.	Highway 81 North	746-4436 After hours: Dave Frambers 746-8177
KRISTYS, INC.	Highway 81 North	775-9801 After hours: Brian Kristjanson 775-2248
MIDWEST INDUSTRIAL EQUIPMENT COMPANY	Highway 2 West	772-4842 After hours: Bob O'Shaughnessy 772-6390
REITEN & YOUNG INTERNATIONAL	Highway 81 North	775-8111 After hours: Dennis Young 775-2427

* If a sufficient supply of tractors is not available from the above sources, the Civil Preparedness Director should request additional units via the media, specifying what type of units are needed and asking that anyone willing to provide such a unit call 775-3809, 775-3831, or 775-3832.

Forklifts - Forklifts unload and move palletted sandbags and other materials. Forklifts available from city departments are listed in Table VII-9:

Table VII-9 - List of City-Owned Forklifts

<u>Department</u>	<u>No. Available</u>	<u>Type</u>
Parks and Recreation	1	
Water Department	1*	Electric

*Inside use only

It is possible that forklifts can be borrowed from the organizations listed in Table VII-10 for at least an initial response. These companies can also furnish operators. If the emergency lasts for an extended period, some forklifts will possibly be recalled and replacement units may have to be rented from forklift rental firms listed in Table VII-10.

Rental units will not come with operators. The private organizations owning the borrowed forklifts would be a good resource for operators, some of whom may volunteer. Additional operators may be obtained from the National Guard, the Grand Forks Air Force Base, and the Grand Forks Fire Department. If additional operators are needed, the Civil Preparedness Director should inform the media and ask volunteer forklift operators to report to the Armory. Forklift operators are listed in Table VII-11.

Maintenance - The owners of the forklifts should be contacted if maintenance (mechanical work and/or parts) is required while they are in use by the city. If authorized, there is a CLARK mechanic available in the city: Mr. Don Mergenthal (775-5480, after hours 772-8444). The Fire Department has a mechanic on duty (775-2548).

Fueling - The Fire Department will fuel forklifts at their work site with gasoline or diesel fuel. If LP gas is required, the owner probably has spare full replacement tanks. On-site LP gas refueling can also be furnished by Solar Gas (775-5393 work and after hours) or Texgas Corporation (775-9714 or 775-8522, no after-hours telephone number). An LP gas tank cannot be expected to last over 8 hours.

Table VII -10 -Privately Owned Fork Lifts

			<u>After hours</u>
CONCRETE SECTIONAL	5 large w/operators	775-6342	775-2748
GARDNER LUMBER	1 large w/ operator	772-4895	775-9725
IRELANDS LUMBER	1 large w/ operator	775-6233	775-5848
L & L MASONRY	1 large w/operator	775-5084	772-7582
LAMPERT BUILDING	2 large w/operators	775-4605	775-2042
MASONRY SUPPLY	5 small w/operators	775-5583	772-0363
SIMONSON LUMBER	1 large w/operator	775-4292	775-7554
SWINGEN CONSTRUCTION	1 large w/operator	775-5359	775-8056
VALLEY CONTRACTING	front end loaders	772-5547	773-9133
WESTGO TRUCK EQUIPMENT	1 small w/operator	772-7148	775-2666
WHALENS MOVING	1 large w/operator	775-5557	772-2429
CLARK LIFT	-maintenance and repair on fork lifts	775-5480	772-8444

FORK LIFTS (rental)
(Subject to availability)

BUTLER MACHINERY COMPANY	775-4238	775-6329 746-1788
CLARKLIFT OF ND (Fargo)	1-282-2334	1-282-2897 1-280-2475
FORX RENT-ALL (if local units unavailable, ask them how soon they can get units from Fargo)	772-7259	handled by answering service
NORTHERN EQUIPMENT AND SUPPLY CORP.	775-4276	772-5885

Note: All forklifts must have the large, pneumatic-type tires and
a minimum lift capacity of 4000 lbs.

Table VII -11 - List of Forklift Operators

	<u>Work</u>	<u>Home</u>
KENNETH BAKKE	775-2548	775-7423
JIM BROTEN	"	775-0232
ERNIE BYZEWSKI	"	775-6733
STEWART CHASE	"	773-2108
C.P. COSS	"	775-7929
LEONARD DELESKI	"	772-1933
ERNIE ELINGSON	"	772-9325
ORRIS EVENSTAD	"	772-0816
ROGER FISH	"	772-6376
CARY FOY	"	772-0682
RICK FOY	"	772-0036
JACK GARRITSON	"	772-4448
ROGER KINGSBURY	"	775-2198
WALLY OSEN	"	773-3416
RONALD PHELPS	"	772-2879
KENNETH RETTKE	"	775-7285
BRUCE ROED	"	218-637-8181
VERNON SANDLAN	"	775-6937
DICK SHERVOLD	"	772-8836
BRADLEY THORESON	"	772-5612
GERALD VEIN	"	772-2260
WALTER WHITTLE	"	772-8853
GEORGE WILSON	"	775-8418
DONAL WRIGHT	"	746-4157

THESE ARE FIRE DEPARTMENT EMPLOYEES

Additional forklift operators can be requested from either the Grand Forks Air Force Base or the National Guard.

If necessary, put out a call to the public via the media for volunteer operators.

Trucks and Trailers - Trucks and trailers will be required to haul sandbags, earth fill for levees, sand, other materials, and equipment during a flood fight. A list of city-owned trucks is given in Table VII-12. A list of private and other truck and trailer sources is given in Table VII-13.

Table VII -12 - City-Owned Trucks and Trailers

<u>SOURCE</u>	<u>TYPE</u>	<u>NUMBER</u>
Health Department	1-1/2 ton flat bed	1
	1/2 ton pickup	1
Park and Recreation Department	1 to 2 ton capacity trucks	8 to 10
	aerial bucket trucks	2
Public Works Department	1-1/2 - 2 ton flatbed	6
	1/2 ton pickup	2
	1 ton ladder truck	1
	aerial bucket truck	1

Table VII-13 - Private and Other Truck Sources

I. Lowboys, Flat Bed Trucks, Flat Bed Trailers

Valley Contracting Company		772-5547
After hours:	Jim McMenamy	772-9317
	Harold Veitch	775-9142
Nodak Contracting Company		775-4205
After hours:		772-9512
Swingen Construction Company		775-5359
After hours:	Richard Lynn	772-3757
	Roger Hilley	772-5288
Peterson Construction Company		775-5501
After hours:	Clarence Peterson	772-6222

National Guard and the Grand Forks Air Force Base also have lowboys and flatbeds.

II. Single Axle and Tandem Flat Bed Trucks

Gardner Lumber Company		772-4895
After hours:	George Gardner	772-0269
Ireland's Lumber Yards		775-6233
After hours:	Wayne Peterson	775-8501
Lampert Building Center		775-4605
After hours:	Todd Sexe	775-2042
Robertson Gambles Home Center		746-6454
After hours:	Dennis Hogfoss	775-3355
Simonson Lumber & Hardware		775-4292
After hours:	Pete Simonson	772-3191

III. Many farms and other businesses also have either flatbeds or stake bodies from which some or all of the stakes can be removed; if necessary, put out a call to the public via the media.

Many of the trucks will have their own drivers; additional drivers can be sought from the National Guard, the Grand Forks Air Force Base, the public, or the Fire Department.

Dump trucks and/or other earthmoving equipment can be obtained from the National Guard, the Grand Forks Air Force Base, or Valley and Nodak Contracting Companies.

Residential Flood Fighting Supplies - The following list is provided so that local residents may upon request be advised of suppliers of flood fighting supplies.

Table VII-14 - Residential Flood Fighting Supplies

Name, Address Telephone (After hours)	Metal or Plastic Plumbing Caps or Plugs	6 mil Poly in rolls	Lite Duty 110 Volt Pumps	Wood Sewer Plugs
MILLERS 1803 S. Washington 772-2701 (773-2552)	X	4mil	X	
STRINDENS South Forks Plaza 775-3148 (772-3217) (772-2749)	X	4mil	X	X
ROBERTSON GAMBLES 1901 32nd Ave. So. 746-6454 (772-4288)	X	X	X	
SIMONSON LBR & HDWE 820 North 3rd Street 775-4292 (773-9414) (746-1915)	X	X		
HARDWARE HANK 418 DeMers 772-6491 (772-4425)	X	X	X	X
HOME OF ECONOMY Hwy 81 North 772-6611	X	4-8mil	X	X
LUNSETH 135 South 3rd Street 772-6631 (same)	X	X	X	X
SEARS 1720 So. Washington 772-5521	X	X	X	
GF GLASS & PAINT 101 S. 3rd Street 775-2541		4mil		
CREATIVE COLOR, INC. (RCA Paint & Body Supply) 513 10th Ave. North 772-4891 (775-9613)		4mil		
DAKOTA WOODWORKS 2012 13th Ave. North 775-5491 (773-1596)				X

Inspection and Maintenance of Existing Facilities

Levees, Floodwalls, and Closures - The Public Works Department is responsible for inspection and maintenance of the Lincoln Park levee and floodwall project, the Riverside and Central Park emergency flood barriers, and all sewer closure devices. All flood barriers will be inspected for subsidence, erosion, animal burrows, or any condition that may adversely affect the structural integrity of the flood barrier. Flap gates will be inspected for icing and other conditions that may prevent proper closure. These inspections will be made sufficiently in advance of the flood season to insure adequate time for needed maintenance and repairs. A map showing the location of existing sewer flap gates and gate valves is given on Plates VIII-6 and VIII-7 of Chapter VIII.

Pumps and Power Sources - Each department is responsible for inspecting and testing available pumps and power sources before the flood season. Worn or defective parts will be replaced to ensure readiness for immediate use.

Communications Equipment - Each department is responsible for insuring that all base station and portable communication equipment is in operating condition. Before an emergency flood fight, each piece of equipment will be tested over the range of assigned channels. Batteries in portable units will be replaced as needed. At least one spare battery will be located at each portable equipment location (Mobile Command Post, etc).

Floodlights and Other Equipment - Each department is responsible for inspecting and maintaining portable lighting equipment used to inspect or construct emergency flood barriers. Portable power sources and batteries will be tested, repaired, and/or replaced as required. Particular attention will be given to worn or damaged power cords and connections to guard against electrical shock during wet field conditions.

AGENCY CONTACTS

When a major flood is imminent and it is apparent that local financial, manpower, and material resources will be exhausted, the Mayor or, at his direction, the Civil Preparedness Director will contact the State Disaster Emergency Services Office Director (see Chapter II for names and telephone numbers). The Mayor or his designee will provide a preliminary report on the nature and extent of anticipated problems, local capabilities in meeting expected problems, and required assistance.

Simultaneous with this coordination with the State, the Mayor can request assistance from the Corps of Engineers (under PL 99 authority) regarding advance flood preparations, provision of technical advice, and use of federally contracted manpower and equipment for emergency flood barrier construction.

DECLARATION OF EMERGENCY

Over the years, emergency flood fights have considerably drained the city's financial, manpower, and material resources. To use the local resources most efficiently, effective criteria and procedures must be established and followed in determining the timing and scale of the flood fight to be undertaken.

Emergency flood barriers have been constructed to protect the Riverside Park and Central Park neighborhoods. Extensive temporary measures are also undertaken by private citizens to protect their individual properties. However, because of inadequate heights, inadequate construction materials and practices, poor foundation conditions, etc., none of these measures guarantee safe and permanent protection. To prevent catastrophic flood losses and potential loss of life from overtopping or failure of flood barriers, a constant watch must be maintained and precautionary measures must be undertaken to provide sufficient preparation and evacuation time.

Accordingly, four levels of warning are established in this flood emergency plan:

Level 1 Warning

A preliminary warning by the Civil Preparedness Director will alert public officials and other key flood fight participants that flooding may be imminent along the Red River of the North or English Coulee. This warning will be issued when the river stage at the USGS gage reaches 28.0 (Elev. 806.35) or when the NWS advises that flash flooding is a distinct possibility along English Coulee. This warning will remain in effect until a Level 2 Warning is issued, the Red River of the North stage has receded below 28.0 for a 24-hour period, or the danger of flash flooding along English Coulee has passed. No public warning is issued with a Level 1 Warning. Specific actions to be undertaken by local officials include:

- A. The Civil Preparedness Director will coordinate with the National Weather Service on the nature of the impending flood threat.
- B. The Civil Preparedness Director will advise involved local officials and key participants that flooding is possible and that they should review their assigned duties and responsibilities.
- C. Commence operation of the EOC with very limited staff.
- D. Begin and maintain a watch over river levels and flow conditions - particularly ice breakup and movement.
- E. Remain in contact with the NWS, the USGS (for RRN gage readings), and gage readers along English Coulee.
- F. Establish and maintain contact with the county's Civil Defense Director.

Level 2 Warning

This level will commence in accordance with the following criteria:

Red River of the North

- A. When the river stage at the USGS gage reaches a stage of 35.0 (Elev. 813.5) or
- B. When the rate of rise at the gage reaches or exceeds 2.5 feet per hour beyond the Level 1 stage of 28.0 (Elev. 806.35).

English Coulee:

It is envisioned that a flood warning system for the upper coulee area will be based on observations of changing water levels at the Interstate Highway 29 crossing. From a study of water surface profiles which are presently being developed for various flood frequencies, the expected flood level in the urbanized area upstream of DeMers Avenue will be correlated with respective flood levels at the I-29 crossing. Three gages set up in the coulee basin west of I-29 will give advance indication of imminent flood conditions. When this occurs, the predesignated gage reader will be directed to obtain gage readings at the I-29 crossing (gage to be established) at 4-hour intervals until a bank-full flow is reached.

This warning level will be maintained until a Level 3 Warning is issued or until Red River of the North river levels continuously recede for a 36-hour period from the 35-foot stage. A review of the major historic floods indicates that it may take from 1 to 3 days for Red River of the North stages to rise from the Level 1 Warning to Level 2 Warning stage. It may take from 2 to 3 days for the river to rise from the Level 2 Warning stage of 35.0 to the minimum of the Riverside Park levee top elevation of 824.7. It becomes imperative at the Level 2 Warning stage of 35.0 that public officials and other key flood fight personnel enter a high state of readiness. Specific actions that must be taken when

this level is reached include:

- A. The Civil Preparedness Director will notify all responsible city, county, and State officials and key designated flood fight personnel that a Level 2 Warning has been reached.
- B. The EOC will commence continuous operation with a full staff directed by a designated EOC Commander.
- C. Establish communication links between the EOC and city departments.
- E. Maintain a continuous watch of river levels and ice flow conditions.
- F. Establish Dike Patrols and commence continuous patrol of all levees and floodwalls.
- G. Provide temporary pumping facilities behind the emergency levees.
- H. Establish traffic controls in low-lying (threatened) areas.
- I. Notify the public that severe flooding may be imminent.
- J. Issue periodic situation reports to neighborhood groups and volunteer organizations.
- K. Alert local suppliers of sand and earth fill, sandbags, other materials, and equipment of a possible need.
- L. Advise residents to: keep abreast of flood developments through the news media; avoid unnecessary travel in threatened areas; cancel or curtail social activities; and, for affected persons, be prepared to evacuate on short notice.
- M. Commence sewer closures (see next chapter for schedule of closures versus river stage).

Level 3 Warning

This warning level will commence in accordance with the following criteria:

Red River of the North

- A. When the river stage at the USGS gage reaches a stage of 42 feet (Elev. 820.35) or
- B. When the rate of floodwater rise at the gage reaches 1.0 feet per hour beyond the Level 2 stage of 35.0.

English Coulee:

When the coulee stage reaches elevation * at the Interstate Highway 29 crossing.

When this warning level is reached, a large flood with major consequences is in progress. This warning level will be maintained until a Level 4 Warning is issued or the Red River of the North floodwater level recedes continuously for a 48-hour period from the 42-foot stage. Some flooding is already occurring in low-lying unprotected areas. Sewer backup has started in the downtown business district and other riverfront areas. It may take 1-1/2 to 2 days for flood levels to exceed top of levee minimum elevations at Riverside Park. A failure along either the Riverside Park or Central Park levees is a possibility because of levee subsidence, seepage, or erosion. Principal specific actions which must be taken include:

- A. Notify responsible city, county, and State officials that a major flood is in progress and that extreme flooding is a possibility.
- B. Notify the public that major flooding is imminent and that affected residents should be prepared to evacuate immediately if and when directed.
- C. Maintain a continuous watch over river levels and flow conditions.
- D. Maintain continuous inspection of all flood barriers.
- E. Maintain traffic control in all affected low-lying areas.
- F. Issue periodic situation reports to neighborhood groups and volunteer organizations.
- G. Notify local Red Cross and Salvation Army officials that they should be prepared to establish disaster relief assistance centers for housing, feeding, and other care of evacuees if and when a Level 4 Warning is issued.
- H. Issue calls for sandbagging volunteers.

*Elevation data to be added when ongoing hydraulic studies are completed.

- I. Close all businesses in areas threatened by surface flooding.
- J. Close public high schools to free students for volunteer work.
- K. Continue sewer closures and initiate sandbagging of utilities as required (see schedule of required closures versus river stage in Chapter VIII).
- L. Have central sandbagging center at the Armory parking lot in full state of readiness with sand, sandbags, and other materials.
- M. Notify area residents where flood fight supplies (sand, sandbags, poly, plugs, etc.) can be obtained.
- N. Advise area residents on the procedures and availability of information concerning the prevention of sewer backup, flood proofing, and securing homes and appliances in the event of an evacuation order.

Level 4 Warning

This warning level will be issued when the following conditions are met:

Red River of the North

- A. When river levels continue rising at a rate of more than 0.6 foot per hour after a stage of 42.0 is exceeded or
- B. When river levels continue rising for a period of at least 12 hours after a stage of 42.0 is reached or
- C. When any flood barrier is in imminent danger of failure.

English Coulee

When the coulee flood stage reaches elevation * at the Interstate Highway 29 crossing.

*Elevation data to be added when ongoing hydraulic studies are completed.

When this warning level is reached, widespread flooding is a distinct possibility, Less than 12 hours may be available from the time a stage of 45.0 is reached until the Riverside Park levee minimum top elevation is exceeded. Thus, prompt and positive action is imperative at this time to protect the lives of residents.

- A. Issue situation reports to the Governor's office and State Disaster Services Emergency Office Director, request personnel and equipment assistance as needed, and request a State disaster declaration for the city.
- B. Notify area residents that an order to evacuate may be issued over the news media, by siren, or by other means, and that they should be prepared to leave immediately.
- C. Continue sewer and street closures as required (see schedule in next chapter).
- D. Notify residents of assigned evacuation routes to designated shelters for the affected areas.
- E. Commence staffing emergency housing, feeding, and other disaster relief centers.
- F. Maintain continuous vigil over all flood barriers.
- G. Reinforce all weak areas on flood barriers.
- H. Maintain security in all evacuated areas.
- I. Advise all Levee Patrol personnel on procedures for immediate evacuation in the event of imminent levee failure.
- J. Maintain continuous watch over floodwater levels and flow conditions.

PROCUREMENT OF VOLUNTEER WORKERS AND EQUIPMENT

Responsibility - All requests for volunteer workers and equipment will be made by the EOC Commander or the Director of Public Works.

Mobilization - Volunteers will be directed by the EOC to report to the Armory rather than to diking sites. Parking will be available in the

lot across North Sixth Street northeast of the Armory. The city's Parking Authority has approved this emergency parking use.

Buses to transport volunteers may be ordered from Dietrich and Sons, Inc. (772-0601, same number after hours). For a smaller sandbagging effort, it may be possible to obtain an extra bus(es) from the city's Director of Administration Robert Simons (775-8103, home phone 772-6876). The Fire Department has one bus and can furnish drivers. The marshaling area for the buses will be the smaller lot on the southeast side of the Armory - the buses may be loaded at the main (northwest) door. Dietrich buses will have radio contact with their base, which can be reached by telephone if necessary; the Fire Department bus may be contacted directly from the EOC. City buses are not radio-equipped.

Data Registration - The Armory Shift commander working under the direction of the EOC Commander will be responsible for signing in volunteer workers when they arrive at the armory and signing out workers when they leave the Armory to go off duty. All volunteers will be required to give their names, addresses, and telephone numbers in addition to sign-in and sign-out times. Forms will be provided; they should be checked daily. Persons not signed out for an extended period (in excess of 8 hours) should be located and accounted for. A sample registration form is given in Figure VII-1. The Armory Shift Commander will maintain a log of all bus runs to and from diking sites. Recorded data as shown on the sample form (see Figure VII-2) will include bus number, destination, and number of workers aboard.

Feeding and Housing - The American Red Cross or Salvation Army has maintained a no-cost coffee and sandwich canteen at the Armory during past floods. This canteen should be set up whenever volunteers will be required. As a general rule, sleep cots will not be provided for volunteer workers.

They will be expected to return to their own residences after their assigned shifts. See Chapter II for Red Cross or Salvation Army persons to contact.

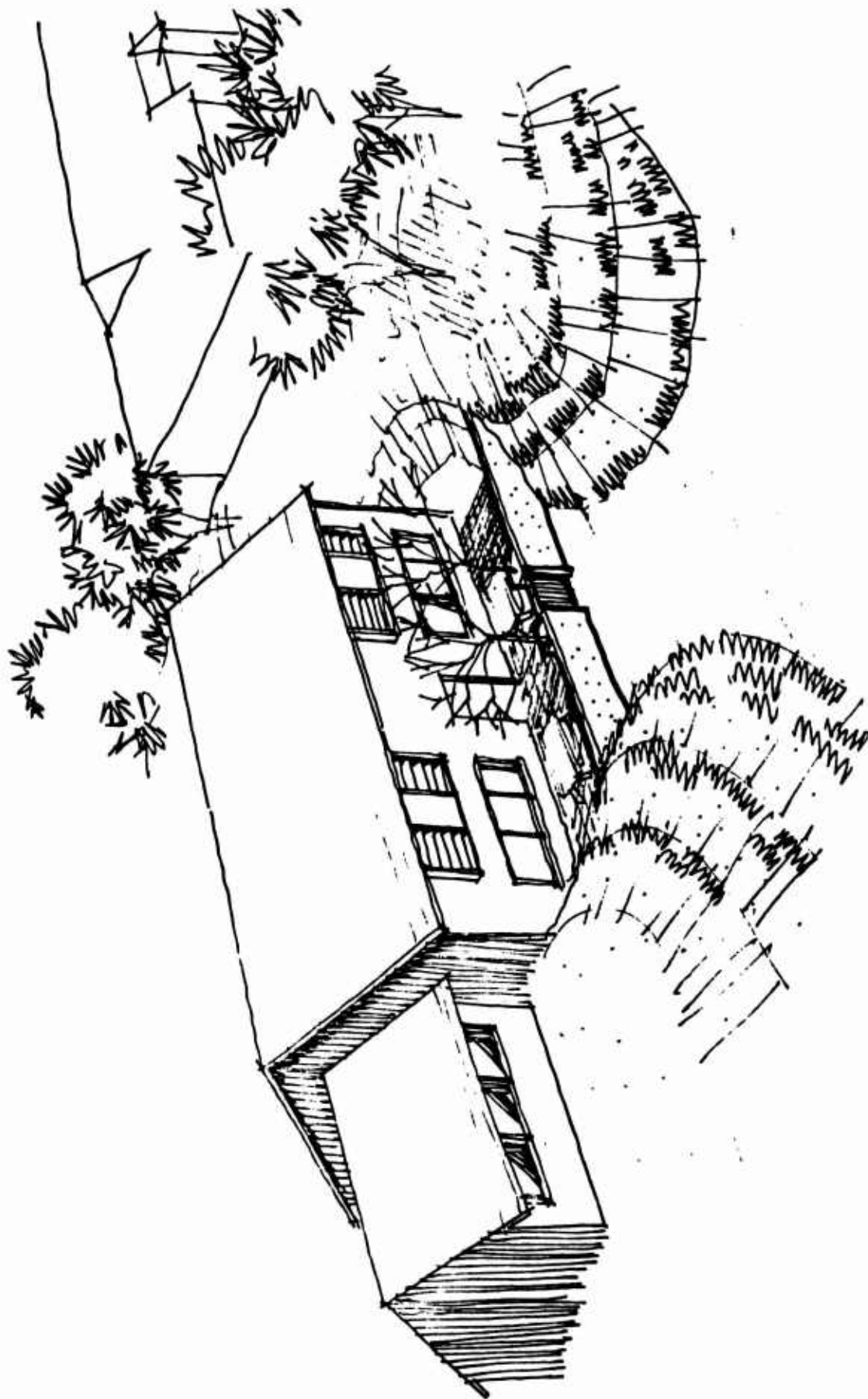
Supervision and Training - The Armory Shift Commanders are responsible for maintaining an adequate staff to supervise all operations at the Armory - the sandbag-filling site, parking lots, and bus marshaling and loading areas. Most, if not all, of the staff needed can be drawn from volunteers at the Armory. If this source is unsatisfactory, the EOC should be requested to furnish additional assistance. Armory employees under Armory Manager Bob Owens are an additional manpower resource.

Training of sandbagging and other crew chiefs is also the responsibility of the Armory Shift Commanders. As discussed earlier in this chapter at least two persons from each neighborhood organization should be trained in the filling and placement of sandbags and other emergency construction practices. These individuals will provide similar instruction to volunteers and residents in sandbag placement and other techniques at diking sites in their neighborhoods (see Plate VIII-8 for dike patrol areas).

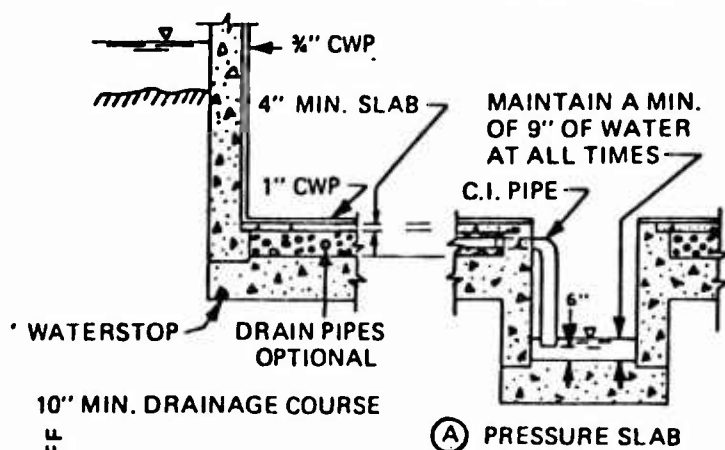
[illegible]**FIGURE VII-1**

[illegible]**FIGURE VII-2**

TYPICAL FLOOD PROOFING



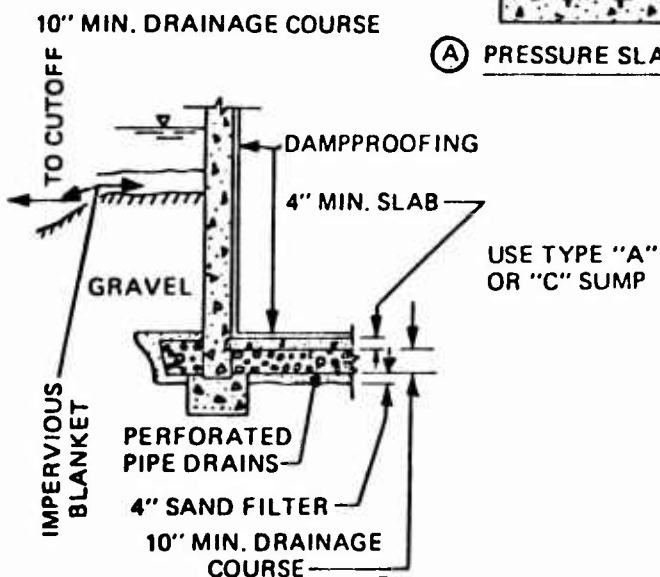
TYPE "A" SUMP



CWP = CEMENT PLASTER
WATERPROOFING

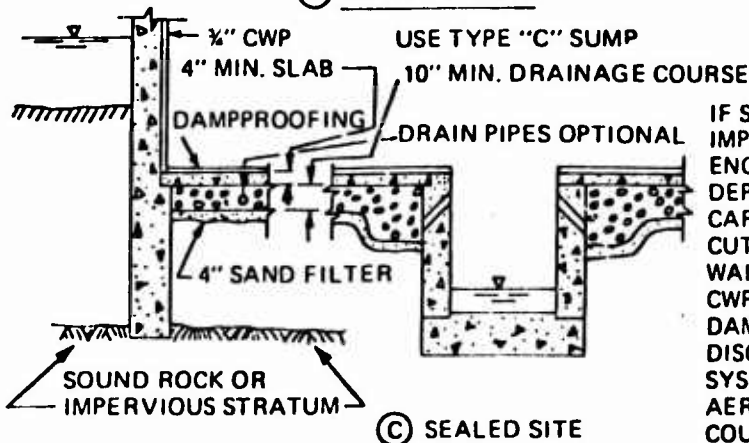
MATERIAL FOR UNDER-FLOOR
DRAINAGE COURSE SHALL
CONSIST OF SOUND, CLEAN
GRAVEL OR CRUSHED ROCK,
3/4 IN. TO 2 IN. IN SIZE

(A) PRESSURE SLAB



FOR PRESSURE RELIEVED
SLAB, PROVIDE PERIPHERAL
DRAIN AT BASE OF
FOUNDATION WALL.
REPLACE CWP ON
FOUNDATION WALL WITH
DAMPPROOFING.

(B) RELIEVED SLAB

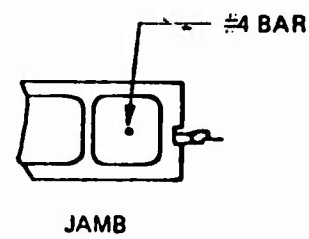
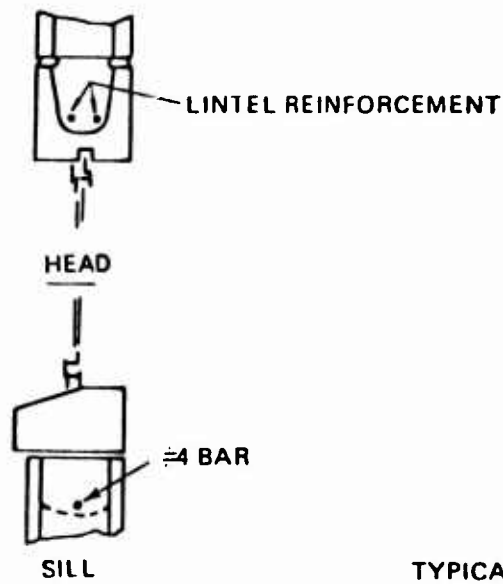
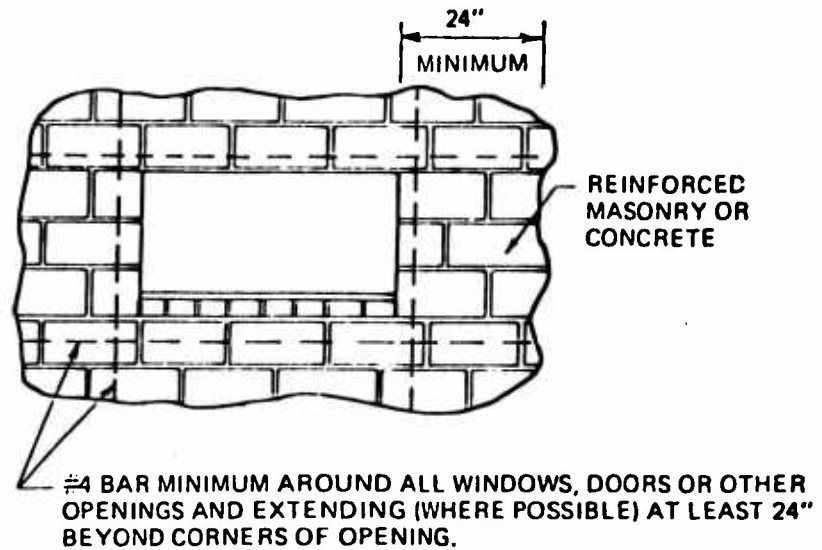


IF SOUND ROCK OR
IMPERVIOUS STRATUM IS
ENCOUNTERED AT SHALLOW
DEPTH BELOW FOUNDATION,
CARRY OUTSIDE WALL AS
CUTOFF. DISPENSE WITH
WALL DRAIN AND REPLACE
CWP ON FLOOR SLAB WITH
DAMPPROOFING. ARRANGE
DISCHARGE FROM DRAINAGE
SYSTEM TO PREVENT
AERATION OF DRAINAGE
COURSE

(C) SEALED SITE

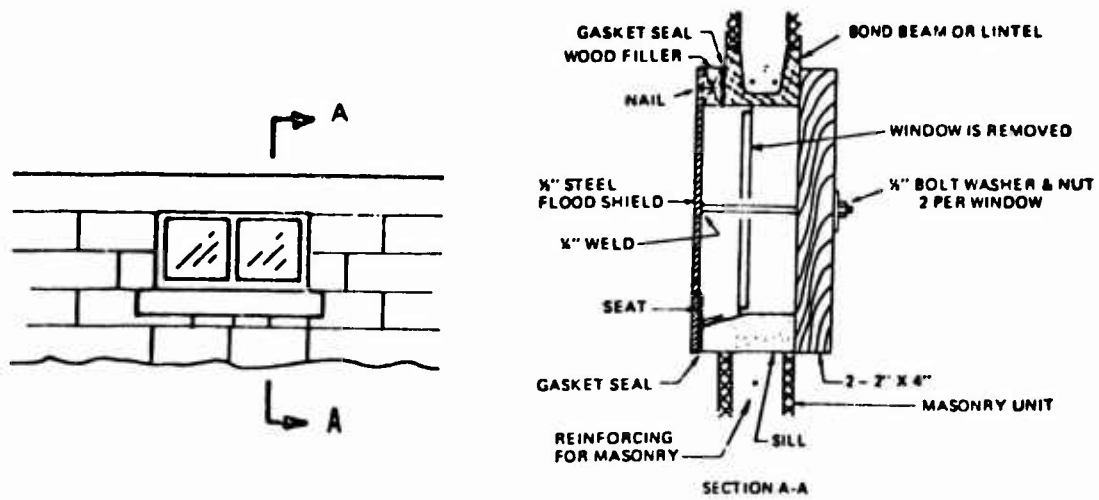
TYPICAL FOUNDATION DRAINAGE AND WATERPROOFING
ADAPTED FROM NAVFAC DM-7

RECOMMENDED REINFORCEMENT AROUND SMALL OPENINGS
AND FOR SHALLOW DEPTH OF FLOODING

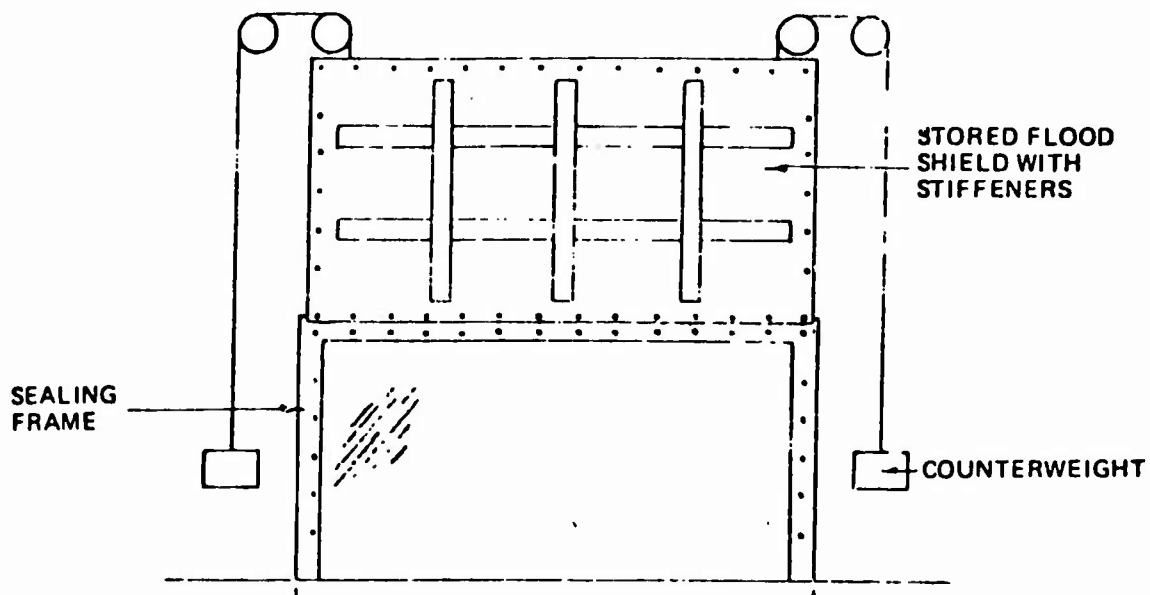


TYPICAL STEEL BASEMENT WINDOW
FOR REINFORCED MASONRY WALLS

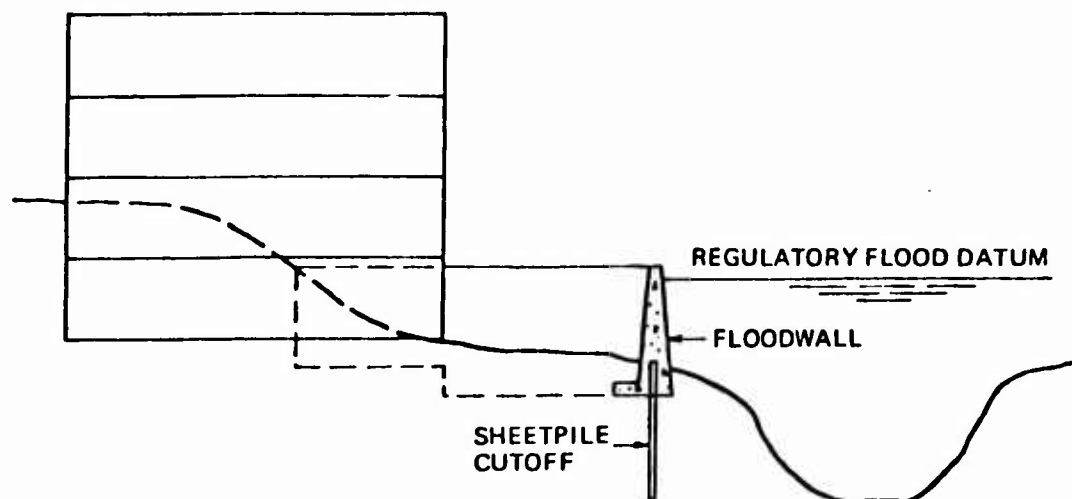
NOTE:
IF OPENING BEGINS AT THE TOP OF A FOOTING, HORIZONTAL REINFORC-
ING SHALL BE PROVIDED AT THE TOP OF THE FOOTING.



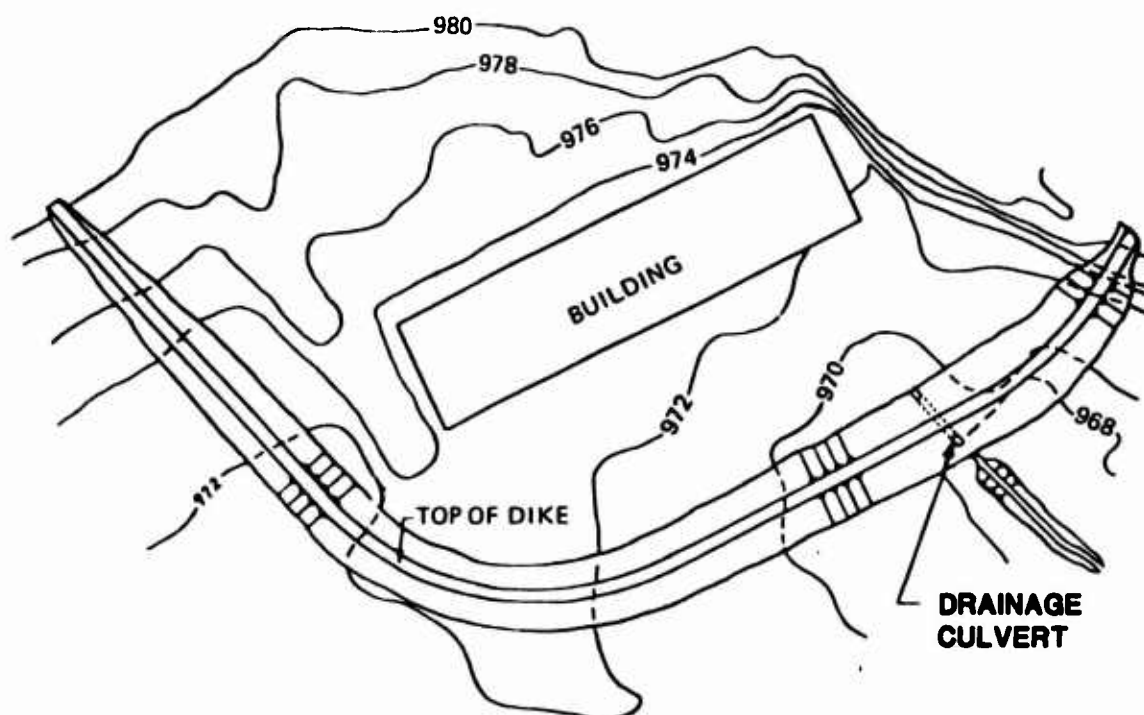
**CLOSURE PANEL FOR BASEMENT WINDOW
FOR SMALL WINDOWS AND SHALLOW DEPTH OF FLOODING**



**FLOOD SHIELD BEHIND WINDOW
LOWERED INTO POSITION & ATTACHED TO
FRAME WITH QUICK DISCONNECT TYPE FASTENERS.**



FLOOD PROTECTION WITH FLOODWALLS



FLOOD PROTECTION BY DIKES

RCO 7--REVISED 1969
CLIFTON F. HALSEY



Using Plastic and Dikes to Prevent Minor Surface Flooding

When heavy snow accumulations melt, standing water is often slow to drain off and can flood lawns and damage yards, wells, feed supplies, machinery, and other property. Problems are more apt to occur where home lawns and farmsteads lack adequate landscaping or the area surface drainage is poor or blocked by malfunctioning drainage systems and ice dams.

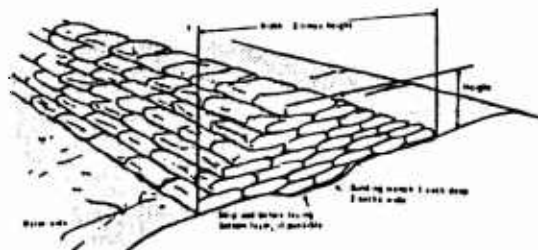
The following method of constructing 1 to 3 feet high, temporary sandbag or earth dikes offers buildings protection from shallow (less than 3 feet of water) flooding.

First, select the site for the dike, making the best use of natural land features to keep it as short in length and

low in height as possible. Avoid trees and other obstructions which would cause difficulty in building a sound structure. The idea, of course, is to trap or divert the water before it has a chance to advance toward buildings. The dike should not be built against the wall of basements; there should be room (8 feet is ideal) to maneuver between the dike and buildings.

Remove all ice and snow (down to the bare ground if possible) from a strip of land about 8 feet wide.

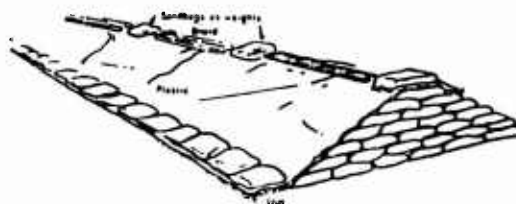
Then build a sandbag or earth dike referring to the following diagrammed instructions. The bonding trench, pictured, may be omitted on lawns.



To seal the finished dike and to increase its watertightness, spread a layer of earth or sand 1 inch deep and about 1 foot wide along the bottom of the dike on the water side. Lay polyethylene plastic sheeting so that the bottom edge extends 1 foot beyond the bottom edge of the dike over the loose dirt and the upper edge extends over the top of the dike. (This plastic should be about 6 mils thick. It comes in rolls 100 feet long and 8 or 10 feet wide.)

Lay the plastic down very loosely so that the pressure of the water will cause the plastic to conform, easily, with the sandbag surface; otherwise the plastic may puncture.

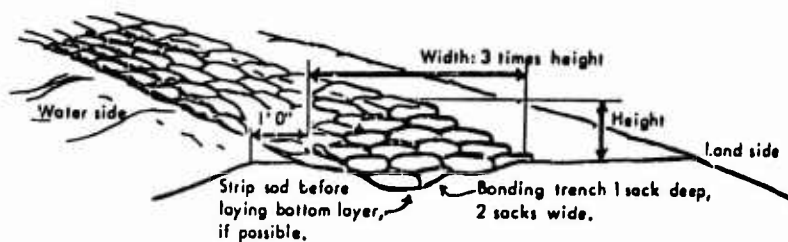
Place a row of tightly fitting sandbags on the bottom edge of the plastic to form a watertight seal on the ground at the bottom (waterside of the dike).



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Laying Sandbags for Flood Control



METHOD OF LAPPING SACKS



Note:

1. Fill sacks approximately 1/2 full of clay, silt, or sand. Do not tie.
2. Alternate direction of sacks with bottom layer lengthwise of dike. Lap unfilled portion under next sack.
3. Tamp thoroughly in place.
4. Build dike 3 times as wide as intended height.

BAGS REQUIRED FOR 100 LINEAR FEET OF DIKE	
Height above dike	Bags required
1 foot	800
2 feet	2,000
3 feet	3,400

Adapted from Emergency Flood Control Activities, Recommended Method for
Sack Laying, U. S. Army Corps of Engineers, Office of the District Engineer, St. Paul.

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Chapter VIII

FLOOD FIGHT PROCEDURES

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Chapter VIII FLOOD FIGHT PROCEDURES

GENERAL

Chapter VII discusses the timing and processes for initiating and implementing the flood emergency plan. This chapter discusses the principal procedures for coordinating emergency flood fight and disaster relief activities and presents self-help plans for floodplain residents. A separate detailed discussion of contingency plans for levee failure and evacuation situations is given in the next chapter.

COORDINATION

A general discussion of interagency and interdepartmental coordination before and during a flood emergency was given in Chapter II, Cooperating Organizations, and Chapter V, Flood Fight Organizational Structure. This section highlights some of the field coordination requirements during an emergency flood fight.

EMERGENCY FLOOD BARRIERS AND CLOSURES

Raising Existing Flood Barriers

The Riverside, Central, and Lincoln Park flood barriers may have to be raised during a major flood. Present minimum top of levee (or floodwall) elevations (i.e., the stage at USGS gage) are 824.1, 828.1, and 830.0, respectively, as shown on Plates IV-3 and IV-4 (see Chapter IV). Extreme caution must be exercised in raising the Riverside Park flood barrier because of poor foundation conditions and possible subsidence. Other factors to consider in raising a flood barrier include high ground for levee tiebacks, acquiring right-of-way on short notice, and required structure relocations.

Required fill volumes for raising the Riverside, Central, and Lincoln Park levees in 1-foot increments are given on Plates VIII-1 through VIII-3. The number of required trucks and trips can be calculated from these volumes by dividing the given fill volume for any predicted stage by the average truck capacity. The required lead time from initial construction to a 1-foot height over the predicted crest can then be determined by multiplying total truck numbers by average turn-around haul time from the borrow source.

New Flood Barriers

For major floods, new temporary flood barriers will be required to protect exposed areas, including the northern part of the Riverside Park area, the downtown area, the area between Central and Lincoln Parks, the Belmont Road area west of Belmont Road and between 13th and 17th Avenues South, and the Belmont Coulee area. Minimum flood stages at which new barriers will be required for these areas are:

<u>Reach</u>	<u>Minimum Elevation</u>	<u>Stage at USGS Gage</u>
Riverside Park - downstream of existing levee	824.9	46.5
Downtown area	828.0	50.0
Central Park to Lincoln Park	830.0	48.8
Lincoln Park - upstream from floodwall to Belmont Road	830.5	49.0
Belmont Road - 13th to 17th Avenue South	827.0	45.5
Belmont Road at Belmont Coulee	827.7	45.9

Although these elevations represent the minimum elevation at which surface flooding will occur - say over Alpha Avenue, North Third Street in the downtown area, or Belmont Road at 15th Avenue South - it is imperative that construction begin before these stages are reached because these flood levels will preclude emergency levee construction on some alignments. Such areas include Seventh Avenue North between North Third Street and U.S. Highway 2 and the reach between the Central and Lincoln Park levees. In the event predicted flood stages exceed

the minimum flooding elevations in these areas, flood barriers should be constructed in advance to permit subsequent levee construction to required heights. Required fill volumes for these new barriers are shown on Plates VIII-1 through VIII-4.

Requests for Corps of Engineers Assistance

When it becomes apparent that local flood fight resources have been or will be exhausted, assistance in the construction of emergency flood barriers may be requested from the Corps of Engineers. When satisfied that this condition is met, the St. Paul District of the Corps will require a formal resolution outlining the city's responsibilities relating to this assistance. A sample reduced-size resolutions form is given on page VIII-7. Since emergency levee construction will be required on private lands, the city will also be required to submit assurances granting entry upon such lands. It must also assure that the U.S. Government will be held free from any claims attributable to the construction works except for damages due to the fault or negligence of the United States (Corps) or its contractors. A sample form outlining these and related assurances is given on pages VIII-8 through VIII-10.

Pumping Requirements

Temporary pumping is required to remove snowmelt and rainfall runoff and seepage through the levees which collect in low areas behind the emergency flood barriers. Minor ditching along the landward toe of the levee may be required to prevent ponding of water around protected developments. Maximum estimated pumping requirements for the existing and new levee reaches (100-year plus 1-foot stage) are given in Table VIII-1.

From these values, the required number of pumps for each area may be computed using pump data given in Table VIII-2 for tractor-driven Crisafulli pumps. Sites for individual pumps will be determined by the

Table VIII-1 - GRAND FORKS FLOOD EMERGENCY PLAN
INTERIOR DRAINAGE REQUIREMENTS

Existing Leveed Areas	Approximate Contributing Drainage Area (Acres)	Length of Barrier (Feet)	Seepage at 1 GPM/Lin. Ft. (GPM)	Runoff* (GPM)	Total Pumping Requirement (Minimum) (GPM)
Riverside Park	202	3550	3550	5050	8600
Central Park	100	1250	1250	2500	3750
Lincoln Park	260	6110	6110	6000	12610
Belmont Road (13th to 17th Ave. S.)	140	1700	1700	3500	5200
Leveed Area Extensions					
Riverside Park (Alpha Avenue)	70	4100	4100	1750	5850
Business District	410	6500	6500	10250	16750
Central Park (S. to Lincoln Pk.)	90	1700	1700	2250	3950
Lincoln Park (to Belmont Rd.)	50	2200	2200	1250	3450
Belmont Road (17th to 25th Ave. S.)	240	3000	3000	6000	9000
Belmont Coulee	1395	1360	1360	34875	36235

* Pumping Rate - KAM

A = Drainage area in acres

K = 25 (RRN) (less than 1-year frequency rainfall event) (See ER 500-1-1)

M = 1 (no substantial ponding)

Public Works Department based on field conditions. Tractor-driven (power take-off) pumps with discharge lines over the levee are best suited for general runoff and seepage pumping. The backup and seepage into storm sewers will also require pumping if sandbag ring dikes prove inadequate. This problem is best handled by the smaller gas or electrically operated pumps.

Table VIII-2 - Pump Data for Crisafulli Pumps*

<u>Size</u>	<u>Gal. Per Min.</u>	<u>Head</u>	<u>Elec. H.P.</u>	<u>Gas or Diesel H.P.</u>	
4"	500	10'	7.5	15	
6"	1000		10	20	
8"	3000		15	25	
12"	5000		25	40	
16"	9500		45	85	
24"	24000		75	170	
2"	150	20'	1		
4"	490		10	20	
6"	850		15	25	
8"	2450		20	35	
12"	3750		30	50	
16"	8000		50		
24"	19000		100	210	
4"	475	30'	12	25	High Head
6"	795		20	35	
8"	2150		25	45	
12"	3450		40	70	
16"	7100		60	125	
24"	16500		125	250	

Use high head pumps for heads over 20'.

* Source: The Crisafulli Pump Company, Inc.

Street, Bridge, and Road Closures

The systematic closure of these facilities in the floodplain will depend on the predicted river stage. A stage-action chart showing stage versus closures and other actions by the Public Works Department is

shown on Plate VIII-5. A list of required actions by stage is given on pages VIII-6a and VIII-6b. A memo concerning required actions by the City Water Department is included at the end of this chapter. Maps showing the locations of required sewer closures are given on Plates VIII-6 and VIII-7. Because the given flood stages represent the stages at which flooding or sewer backup begins it is imperative that the actions be taken in time so that impaired access caused by poor roads, flooding, or snow and ice cover does not prevent or delay these actions. These facilities and adjacent area conditions should be inspected before a flood to effect necessary actions when required. The Police Department, in coordination with the Director of Public Works is responsible for street, bridge, and road closures.

INSPECTION AND MONITORING

General

The Director of Public Works, supported by the Corps of Engineers, is responsible for inspecting flood barriers. The EOC Commander is responsible for monitoring flooding conditions. The Fire Department inspects and monitors flooded areas for floating hazardous materials and fuel tanks. The Police Department maintains surveillance in flooded and/or evacuated areas.

Dike Patrols

Neighborhood Dike (levee) Patrols are supervised by a designated representative from each neighborhood area. The representative is continuously on-call. Designated Neighborhood Dike Patrol Supervisors are listed in Table VIII-3:

FLOOD PLAN (Revised 2/80)

NOTE: All elevations marked (C) will also be affected by the English Coulee, independent of flood gate readings.

<u>Flood e Reading</u>	<u>Responsibility</u>	<u>Description</u>
16	WW	Water backs into wet pit of Lift Station #3, shut off L.S. #3
18.5	WW	72" flapgate near Lift Station #3
19.0	WW	Close 18" sheargate near Lift Station #3
20.4	WW	Weir at Lift Station #1 starts working
20.6	S	Close shear gate on Lewis Boulevard on river side of dike Place pump in C.B. on other side of dike, in alley
25.0	S	Close shear gate on dike at 1616 Riverside Drive Place pump in C.B. on other side of dike
25.8	WW	Close sheargate at Lift Station #5 in manhole
26.0	WW	Switch over Lift Station #1 - close gate at dike (flood pumps automatic)
27.1	WW	Close shear gate at Storm Lift in Central Park
28.0		Flood Stage
29.0	WW	Close shear gate at 1604 Riverside Drive on dike (or water backs into L.S. #4)
29.6	WW	Close shear gate in M.H. on University Avenue between 3rd Street and 4th Street
30.6	S	Close shear gate on Riverside Drive on river side of dike Place pump in C.B. on other side of dike
32.4	WW	Close shear gate in NE manhole at Division and S. 3rd Street Shut off L.S. #1 & #2, close 10" C.V. on dike by Central Park storm lift
33.0 (C)	WW	Plug bypass from coulee into Lift Station #17A - check flapgate
33.2		Flood of Lift Station #1
33.6 (C)	S	Flapgates on N. Columbia Rd. north of U.S. Hwy. #2, near Valley Contracting Co.
34.8	WW	Floor of Lift Station #3 - shut valve to wet pit, pull motors
35.5	S	Flapgate below Kennedy Bridge
36.2	WW	Close shear gate in M.H. at Minnesota & 3rd St. (from lime sludge plant)
37.5	WW	Check "waterproof" casting on sanitary sewer M.H. south of 60" RCP on Belmont Road
38.0 (C)	WW	Shut valve on bypass to coulee at Lift Station #17
	WW	Floor of Lift Station #2 - remove motors
	S	Sandbagging around hole at 1816 Riverside
38.0	S	1710 Riverside - Plug 6" M-J pipe through base of dike (2 each)
39.3		Seepage in basements of business district
40.0 (C)	WW	Check 48" flapgate at 11th Ave. S. & coulee (from storm lift station at 11th & 20th St.)
40.4		Problems at L.S. #8 - excess water back in bypass
41.0	S	Floodgates on Lewis Blvd.
41.0 (C)	S	2 Flapgates west of S. 30th St., behind hospital
41.9	S	Sandbag C.B.'s at Kennedy Underpass on Lewis Blvd.

* S-Streets WW-Wastewater

FLOOD PLAN Cont'd

Reading	Responsibility	Description
42.0	WW	Floor of Lift Station #8
	S	Barricade Belmont Road - 13th & 17th Ave. S.
42.0 (C)	WW	Seal manhole covers on sanitary sewer on Hwy. 81 North
(C)	WW	Seal manhole covers along RR tracks from Columbia Road east
42.3	S	Floodgates on Park Ave. & N. 1st St.
42.5 (C)	S	Flapgates @ coulee on 17th Ave. S. (south side)
42.7	S	Lowest flapgate in Sunbeam Addition
43 & 45 (C)	WW	Manholes by coulee from University dormitories to Lift Station #15 (behind School for the Blind)
43.5 (C)	S	Flapgates at S. 30th St. & DeMers Ave. & 14th Ave. S.
43.8 (C)	S	Intersection of 10th Avenue North & North 25th Street
43.8 (C)	S	Flapgate in M.H. @ Shakespeare & 13th Avenue North
43.9	S	C.B. at easement between Elmwood and Olson
44.0	WW	Manhole behind Frito Lav (cover at 40, water around casting at 44)
44.5		Riverside Dike - Sandbags (1604 Riverside)
44.9		City Hall boiler room floor drain
45.0	S	Center line bridge on S. Belmont Rd. - Barricades @ Terrace Drive & 47th Ave. S.
45.0		Point Bridge closed from E.G.F. - Point Bridge approach from G.F. closed
45.2 (C)		Sorority House @ University & Princeton St. - slab of walkout basement
45.7		Riverside Park dike (Sandbag) (behind Richmond's)
46		Lincoln Park dike by concrete (sandbag)
46.2	S	Intersection of Minnesota & S. 3rd St.
46.8	S	DeMers Avenue Bridge approach
46.8	WW	Floor of Lift Station #9 (Sandbag)
	WW	Manholes behind East Hall (on UND campus)
	WW	Plug bypass at old Airport between storm and sanitary sewers
47		Central Park dike (Sandbag)
47 (C)	S	Clay dike or sandbags @ 30th St., both sides of DeMers Ave.
47.5	S	Lowest catch basins on Elmwood Drive
48	WW	Top of L.S. #85 east of Riverside & Fenton
48.3	WW	Top of Lift Station #24 (Sandbag)
48.8	WW	Floor of Lift Station #4 (Sandbag)
49.0	S	2 Manholes at S. 10th St. & 32nd Ave. S.
49.1		1979 Flood Crest
49.5 (C)	S	University Ave. & English Coulee
49.6	S	Kennedy Bridge approach
50.0		Railroad bridges impassable
50.2		1897 Flood Crest
51.9		Lincoln Park dike
54.6		"100 year" flood

RESOLUTION OF THE (BOARD OF COUNTY COMMISSIONERS)
(CITY OR VILLAGE COUNCIL) OF

WHEREAS, Public Law 99, 84th Congress, as amended, (33 U.S. Code, Section 701 a) provides a means of preparing for and combating damage by floods and flood waters; and

WHEREAS, () has exhausted all resources available to it for flood emergency preparation and flood fighting and rescue operations; and

WHEREAS, on the date of this Resolution emergency flood preparation is needed and assistance required for this purpose as well as for flood fighting and rescue operations; and

NOW, THEREFORE, BE IT RESOLVED That the U.S. Army Corps of Engineers be, and is hereby, requested to furnish assistance in flood emergency preparation and in flood fighting and rescue operations.

BE IT FURTHER RESOLVED That in consideration of such assistance the above named Governmental body agrees to:

- a. Provide without cost to the United States all lands, easements and rights-of-way for the emergency work, including, but not limited to, levee, borrow, spoil and access rights-of-way.
- b. Hold and Save The United States free from all claims for damages attributable to the construction works except for damages due to the fault or negligence of the United States or its Contractors.
- c. Operate and maintain the emergency construction works for the duration of the flood emergency.
- d. Provide common labor.
- e. Provide as required under the applicable provisions of Public Law 91-646 relocation assistance payments to those eligible because of dislocation of persons or property from their dwellings, farms or businesses due to the acquisition of rights-of-way for the emergency flood construction work.
- f. Remove after the flood emergency without cost to the U.S. Army Corps of Engineers any temporary emergency works constructed for the flood emergency if such removal is required.

BE IT FURTHER RESOLVED That the (Chairman of the County Board of _____) of (Mayor of the City of _____) be authorized to enter into agreements with the Corps of Engineers as to the means of supplementing the local flood emergency preparation and flood fighting and rescue operations.

(Chairman) or (Mayor)

Dated: _____ Number _____
Number _____

*Forms (full-size) can be obtained from the St. Paul District,
U.S. Army Corps of Engineers

District Engineer
U.S. Army Engineer District, St. Paul
1135 U.S. Post Office and Customhouse
St. Paul, Minnesota 55101

ASSURANCE FORM AND PERMISSION TO ENTER UPON LAND

EMERGENCY FLOOD CONTROL

PUBLIC LAW 99, 84th CONGRESS

Dear Sir:

(hereinafter referred to as "Sponsor") does hereby request the Federal Government, under the authorization contained in Section 5 of the Flood Control Act approved August 18, 1941, as amended (33 U.S.C, 701n), to provide supplementary assistance in performance of protective work required to cope with predicted flood flows, including the raising, strengthening and extending of Sponsor's levees by sand bagging or other temporary means.

In consideration of the benefits which are expected to accrue by reason of the participation of the United States in said emergency flood control work, Sponsor does hereby agree and pledge that it will truly and faithfully perform the following conditions, to-wit:

a. Provide without cost to the United States all lands, easements and rights-of-way for the emergency work, including, but not limited to, levee, borrow, spoil and access rights-of-way.

b. Hold and Save the United States free from all claims for damages attributable to the construction works except for damages due to the fault or negligence of the United States or its Contractors.

c. Operate and maintain the emergency construction works for the duration of the flood emergency.

d. Provide common labor.

e. Provide as required under the applicable provisions of Public Law 91-646 relocation assistance payments to those eligible because of dislocation of persons or property from their dwellings, farms or businesses due to the acquisition of rights-of-way for the emergency flood construction work.

f. Remove after the flood emergency without cost to the U.S. Army Corps of Engineers any temporary emergency works constructed for the flood emergency if such removal is required.

AND the said Sponsor, as part of the aforesaid consideration, does hereby release and forever discharge the United States, its officers, employees, agents, and assigns, in the prosecution of the proposed emergency flood control work herein contemplated, from all claims, demands, actions and causes of action whatsoever, which may arise by reason of, or in any manner have grown out of or alleged to have grown out of, the construction of the said flood control work as herein contemplated.

PERMISSION is hereby granted to the United States of America, its officers, employees, agents and assigns, and the Government contractors, their officers, employees, agents and assigns, to enter upon Sponsor's lands and rights-of-way, including any additional rights-of-way to be obtained by said Sponsor, for the purpose of performing the emergency flood control work hereinabove described.

IT is hereby certified that the undersigned have the legal authority to execute the above agreement; that the assistance herein requested is beyond the capability of local authorities; and that every possible effort shall continue to be made at the local level to accomplish effective protection from the flood.

EXECUTED this _____ day of _____, 19____.

(Affix official seal here;
if none, so state)

(NAME OF LOCAL INTEREST) :

ACCEPTANCE OF ASSURANCES

The foregoing Assurances of the _____

are hereby accepted for and on behalf of the United States of America.

DATE: _____

District Engineer

Table VIII-3 - Neighborhood Dike Patrol Supervisors

<u>Neighborhood Area</u>	<u>Dike Patrol Supervisor*</u>	<u>Telephone Number</u>
Riverside Park		
Central Park		
Lincoln Park		
Belmont Road		
Belmont Coulee		

To be designated.

The Dike Patrol operates on 4-hour shifts, with 6 shifts per day. No person under 18 years of age is permitted on Dike Patrol. Two persons are in each patrol area each shift. A map of assigned patrol areas is shown on Plate VIII-8. The patrollers sign in or out at the Mobile Command Post when starting or completing their shift. A sample reporting form is given on Figure VIII-1. Each patrol unit makes a verbal report on field conditions to the oncoming patrol unit and the Neighborhood Dike Patrol Supervisor. The supervisor then issues his verbal shift report to the area Mobile Command Post commander.

The dike patrollers report seepage, levee subsidence, erosion, overtopping, drainage pumps not operating, or any other changing field condition immediately via their portable radios to the Mobile Command Post. When overtopping or failure of a levee appears imminent, the patrollers should leave the area at once, seek safety on the nearest available high ground or stable levee, and issue a warning to the Mobile Command Post. Quick warning is imperative to get evacuation measures under way.

With 6 shifts per day, about 84 dike patrollers will be required to cover existing levees and a raise of Belmont Road between 13th and 17th Avenues South. A breakdown by neighborhood area is given in the following table.

Table VIII-4 - Number of Dike Patrollers Per Day by Neighborhood Area

<u>Neighborhood Area</u>	<u>No. of Patrollers</u>
Riverside Park	24
Central Park	24
Lincoln Park	24
Belmont Road	12

If additional levees are built in response to a major flood, another 84 patrollers will be required as shown below:

<u>New Levee Area</u>	<u>No. of Patrollers</u>
Northern Riverside Park	12
Downtown Area	24
Central Park to Lincoln Park	12
Belmont Coulee and Belmont Road (extended)	24
Medvue Estates	12

Each dike patroller is fitted with a life vest, hard hat, identifying arm band, and portable radio that will be furnished by the EOC Commander. Night shifts between 8 p.m. and 8 a.m. are issued flashlights. All equipment is checked in at the end of each shift. The Neighborhood Dike Patrol Supervisor is responsible for arranging transportation for dike patrollers.

BOAT OPERATIONS

1. The Fire Department has two 16-foot trailer-mounted boats equipped with outboard motors suitable for use either on the Red River or in flooded areas (775-2548). Radio communications can be maintained.

2. The U.S. Coast Guard Station in St. Paul processes requests from this area for small boats (1-612-725-7452; after hours, either leave your message on the tape or call Lt. Cmdr. Steven Hungness at home 1-612-459-6031). In 1979, the Coast Guard operated primarily in East Grand Forks, but also served the English Coulee area. They can provide up to 12 shallow-draft boats equipped with outboard motors, radio communication, and crews. These boats are not suitable for the main channel. The Civil Preparedness Director shall make the request. The Coast Guard also requires a letter of need mailed to the:

Coast Guard Marine Safety Office
P.O. Box 3428
St. Paul, Minnesota 55156

or hand delivered to the responding officer-in-charge.

3. Boats may also be requested from the Corps of Engineers if necessary.
4. The National Guard can provide several small fishing-type boats for evacuation purposes; they may not have motors. They also have two amphibians ("ducks") and a 27-foot craft suitable for operations only in the main channel. Excessive wake and wave action preclude their use near the dikes. Expect delays up to 6 hours between the original request and launching because prior approval is needed from Bismarck and the boats must be moved from Devils Lake.
5. Good results can be obtained from the public via a media request for a specific type of boat; i.e., "shallow-draft rowboats with oars, not over 14 feet in length, etc. Please call (our numbers) if you can volunteer such a boat."

Experience has shown that boats and motors can be damaged very easily during operations in flooded areas as a result of hitting underwater obstructions. For this reason, it is preferable not to use privately-owned boats unless necessary.

BLASTING OPERATIONS

Purpose

Blasting may be needed to clear the river of ice or debris jams. However, because of the dangers inherent in blasting in an urban area, clearing using clamshell or "headache ball" cranes should be considered before blasting is ordered.

Authority

The Director of Public Works and the Mayor have the authority to order blasting.

Coordination

Because public and/or private property could be damaged, decisions to blast should be coordinated with those most likely to be affected, such as the authorities in East Grand Forks, the North Dakota State and county highway departments, and the railroad. If a delay can be tolerated, the Burlington Northern (BN) Railroad feels it can do its own clearing and/or blasting at its bridges.

Available Resources

1. THE NATIONAL GUARD has qualified personnel. There will probably be a delay of up to 12 hours between the formal request to the National Guard at Grand Forks and actual blasting. The city

may have to furnish the explosives. The Grand Forks Air Force Base does not have this capability.

2. SWINGEN CONSTRUCTION CO. of Grand Forks has done some blasting (775-5359, if no answer, call 772-3757).
3. VALLEY CONTRACTING CO. of Grand Forks may be able to furnish a crew, but a serious delay may be expected (772-5547).
4. MR. JERRY LIEBELT of Bismarck has done ice blasting and is available within 6 hours (1-223-1212, 1-223-0632, or 1-223-0633; after hours, 1-255-1370). Mr. Liebelt is the owner of the Bismarck Powder Co. and is a supplier of explosives, wire, and caps.
5. BAGLEY CO-OP ELEVATOR, Bagley, Minnesota (1-218-694-2256; after hours 1-212-694-6708) stocks an explosive called KINE-STIK, wire, and caps. The user may wish a different type of explosive. The explosives would have to be carried across the State line; therefore, they should be delivered rather than picked up.

MAINTENANCE OF ESSENTIAL CITY SERVICES

Even during a flood emergency, certain basic services including sewerage, water supply, fire fighting, garbage and refuse collection, security, and traffic control must be maintained. As under normal circumstances, the Public Works Department maintains water supply, sewerage, and garbage and refuse collection services. In the unlikely event of a disruption or contamination of the potable water supply, the National Guard and/or Corps of Engineers can be asked to provide portable water supply facilities. In the event of flooding or equipment breakdowns at the city's wastewater plant, the city's sanitarian advises the State Department of Health and U.S. Environmental Protection Agency of the need to temporarily discharge untreated sewage into the river.

For garbage and refuse collection services in areas with impassable streets or traffic controls, residents may be asked to deposit their garbage and refuse at centralized pickup stations. The city's Health Officer is advised of any solid waste disposal practices that may adversely affect the health or safety of area residents.

The Police Department maintains security and traffic control in threatened and/or evacuated areas to keep sightseers and other unauthorized persons from entering restricted areas and to prevent undue traffic interference with emergency construction equipment. The Police Department, in coordination with the Public Works Department, places temporary street and bridge barriers to restrict traffic. Assistance in manning these locations may be obtained during a major flood emergency from the Air or Army National Guard. The Police Department provides traffic control services along designated evacuation routes as required to permit fast evacuation of threatened areas. (See next chapter regarding designated routes in relation to river stage.)

PUBLIC UTILITY AND STORAGE TANK INFORMATION

The Northern States Power Company (NSP) does not project any serious power outages in Grand Forks resulting from flood crests up to about 50 feet. Its main concern is the substation on Kittson at the Ring Road; it can be protected or a portable substation can be used. Minor localized outages of short duration may be caused by riverside power lines in the north section of the city being taken out by ice or floating debris. However, service should be restored within 2 hours in this case.

NSP feels capable of protecting its own property and facilities without help from volunteers.

NSP has stated it will respond to calls from either the owner, the Fire Department, or the EOC Commander (795-5202) to cut off power to buildings or houses that are flooded. It is dangerous to be in a flooded building where electrical power is still on.

Exterior gas meters should be removed in flooded areas because they may break off. Interior gas meters are less susceptible to this type of damage. Cable TV or telephone service need not be disconnected during flooding.

Buried underground tanks can rise to the surface during floods. LP gas tanks and other aboveground or exposed tanks can break loose from their moorings. Local residents and flood fight personnel should be advised that, if this occurs, the Fire Department should be notified immediately.

Before NSP will reconnect service, the system must be inspected by the city's Building Inspector.

SELF-HELP PLANS

General

While public emergency flood fight activities are going on, substantial similar, but smaller scale, measures will be undertaken by residents and businesses to protect their own properties. While most have the desire and ability to do this work, many will lack the technical know-how as to what to do, when to do it, and with what materials.

Chapter 7 discusses the preflood education program that the city should undertake to advise residents and businesses on the availability of flood insurance, advantages and limitations of flood proofing, sand-bagging techniques, and the importance of understanding flood forecasts. The EOC can expect numerous requests for assistance and ad-

vice; the following technical information will help private interests constructing protective measures and preparing for possible evacuation.

Sandbagging

Sandbag dikes can be used to seal doorways and walkout level entrances up to heights of about 3 feet. Greater heights are generally beyond the capability of individual efforts. Care must be taken to remove all ice, snow, and other materials which could permit excessive seepage at the base. Polyethylene ("poly" film, 4 to 6 mil) is effective in preventing seepage through the barrier. The proper methods for filling sandbags, placing the bags (overlapping of empty portion), and anchoring the "poly" are shown on Plates VII-6 and VII-7. A sump or pit must be constructed to which seepage can be drained and pumped over the barrier. Small 110-volt pumps capable of 40 to 50 gallons per minute (gpm) are generally sufficient for individual residents. A list of sandbag suppliers is given in Table VII-2 of Chapter VII. Sand fill will be provided by the city at no charge at strategic locations announced by the EOC. A list of suppliers of other residential flood fighting supplies is given in Table VII-14.

Flood Proofing

Extensive flood proofing measures would have to be constructed well in advance of a flood. Typical measures including permanent levees or floodwalls around walkout entrances, foundation drain systems, basement waterproofing, and sealing of window and door openings are illustrated on Plates VII-1 through VII-5. Sewer backup through gravity drainage or sewer systems may be a problem; sump pumps and/or various types of valves can be used to pump out or prevent sewer backup, respectively.

Examples of permanent backflow devices are shown on Figure VIII-2. Alternative devices which can be quickly installed include inflatable rubber plugs, mechanically expandable rubber plugs, or tapered wooden plugs. Suppliers of various types of sewer plugs are listed in Table VII-14 of Chapter VII-7.

Equipment Relocation and/or Shut Off

When sandbagging or flood proofing measures are impractical - expected flooding is greater than 3 feet or the structure is unsuitable for flood proofing - it is advisable to suggest that affected residents move furniture, equipment, and belongings to a flood-free level. Where furnaces and gas and electrical appliances cannot be moved, they must be shut off before the basement is flooded. Electrical or gas service will be disconnected only by NSP at the request of the Police Department, Fire Department, or EOC Commander before flooding of the structure has begun. Telephone service need not be disconnected. A list of home evacuation procedures, including these shut off requirements, is given in Chapter IX.

Intentional Basement Flooding

Some residential basements are subject to collapse from excessive groundwater pressures; other basements will be flooded by dirty water entering through cracks, windows, or other openings.

Basements constructed of concrete block are more susceptible to leaks and cave-in than are poured basements; however, any basement is subject to collapse if the ground outside the walls is saturated and/or flooded. Fresh cracks or bowing inward are signs the walls are under severe stress.

Ring dikes built at least 8 feet from the basement walls should preclude the necessity of flooding the basement.

The decision to flood a basement must be made by the owner. Property owners will be advised only that this service is available from the Fire Department on a first-come, first-served basis. The Fire Department will insist that a "hold-harmless" form be signed beforehand. These forms are on file at the central fire station. A sample form is shown in Figure VIII-3.

DIKE PATROL REGISTRATION FORM

Year 19__

	Name	Telephone	Area	Name	Telephone	Area	Name	Telephone	Area	Name	Telephone	Area
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
	PAST MIDNIGHT			EARLY MORNING			MORNING			MORNING		
	1:30 AM - 4:00 AM			4:30 AM - 7:30 AM			7:30 AM - 10:30 AM			10:30 AM - 1:00 PM		

Figure VIII-1

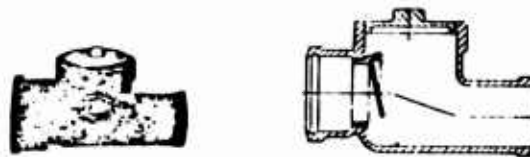
PREVENTION OF BACKFLOW THRU SEWER SYSTEM



(a)

(b)

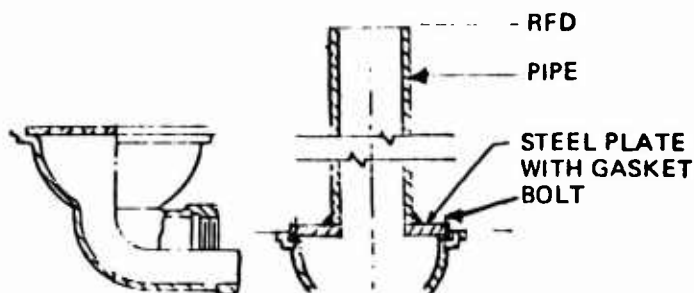
FLOOR DRAIN WITH INTEGRAL BACKWATER VALVE



BACKWATER VALVE - FLAPPER TYPE - AUTOMATIC



BACKWATER VALVE - GATE TYPE COMBINATION - MANUAL & AUTOMATIC



REMOVE GRATE AND
INSTALL STANDPIPE.
USE ONLY WHERE
FLOOR SLAB WILL TAKE
UP-LIFT PRESSURES

EXISTING BASEMENT DRAIN FLOOD-PROOFING

TYPICAL BACKWATER PREVENTION SERVICES

INDEMNITY AND HOLD HARMLESS AGREEMENT

I, _____, having a current post office address of _____, am the OWNER or LEGALLY AUTHORIZED AGENT OF THE OWNER (Cross out one) of a threatened building having the address of _____.
Grand Forks, North Dakota. I hereby agree to indemnify and hold harmless the City of Grand Forks, North Dakota, and its officers, agents, and employees from and against all claims, damages, losses, and expenses, including reasonable attorney's fees (in the event it shall be necessary to file or defend an action) for bodily injury, illness, death, or property damage, including loss of use, arising out of and in any way connected with the purposeful flooding of the basement of the above referenced building.

This agreement shall be effect at _____: AM PM (Cross out one) _____, 19__ and shall continue in full force and effect until the purposeful flooding and the effect thereof ceases.

Dated this _____ day of _____, 19__.

OWNER

AGENT

Witnessed: _____ (Cross out one)

Witnessed: _____

NO BASEMENTS SHALL BE FLOODED BY THE GRAND FORKS FIRE DEPARTMENT WITHOUT A SIGNED AGREEMENT. THE UTILITY COMPANY MUST CUT SERVICE TO THE BUILDING BEFORE FLOODING IS COMMENCED.

Figure VIII-3



CITY OF GRAND FORKS

BOX 1518

GRAND FORKS, NORTH DAKOTA 58201

DEPARTMENT OF WATER
& WASTEWATER

February 19, 1980

(701) 779-8103

ATTENTION: Mr. Frank Ortmeyer, Director of Public Works

FLOOD PROCEDURE - WATER DEPT.

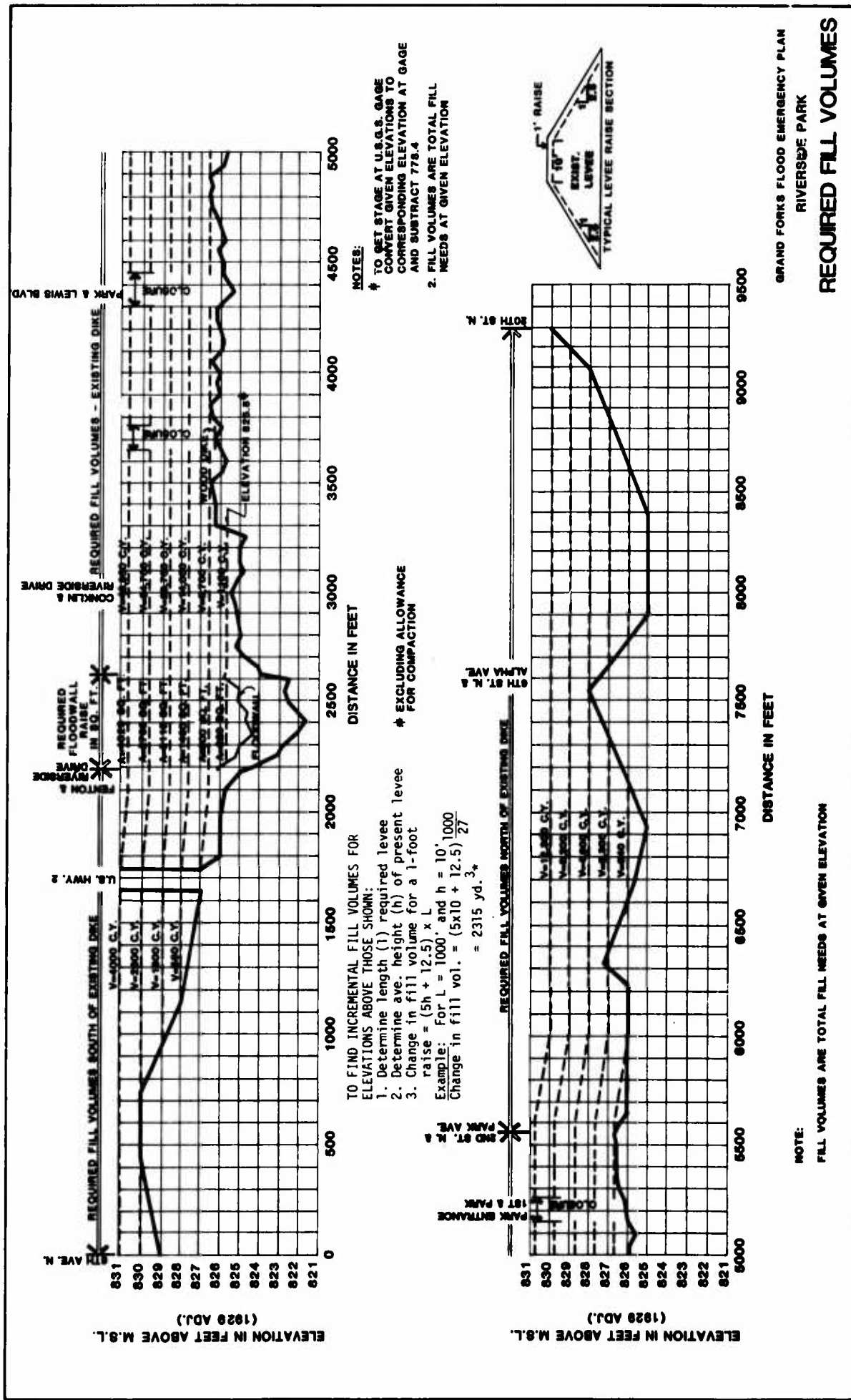
Flood Gauge Reading

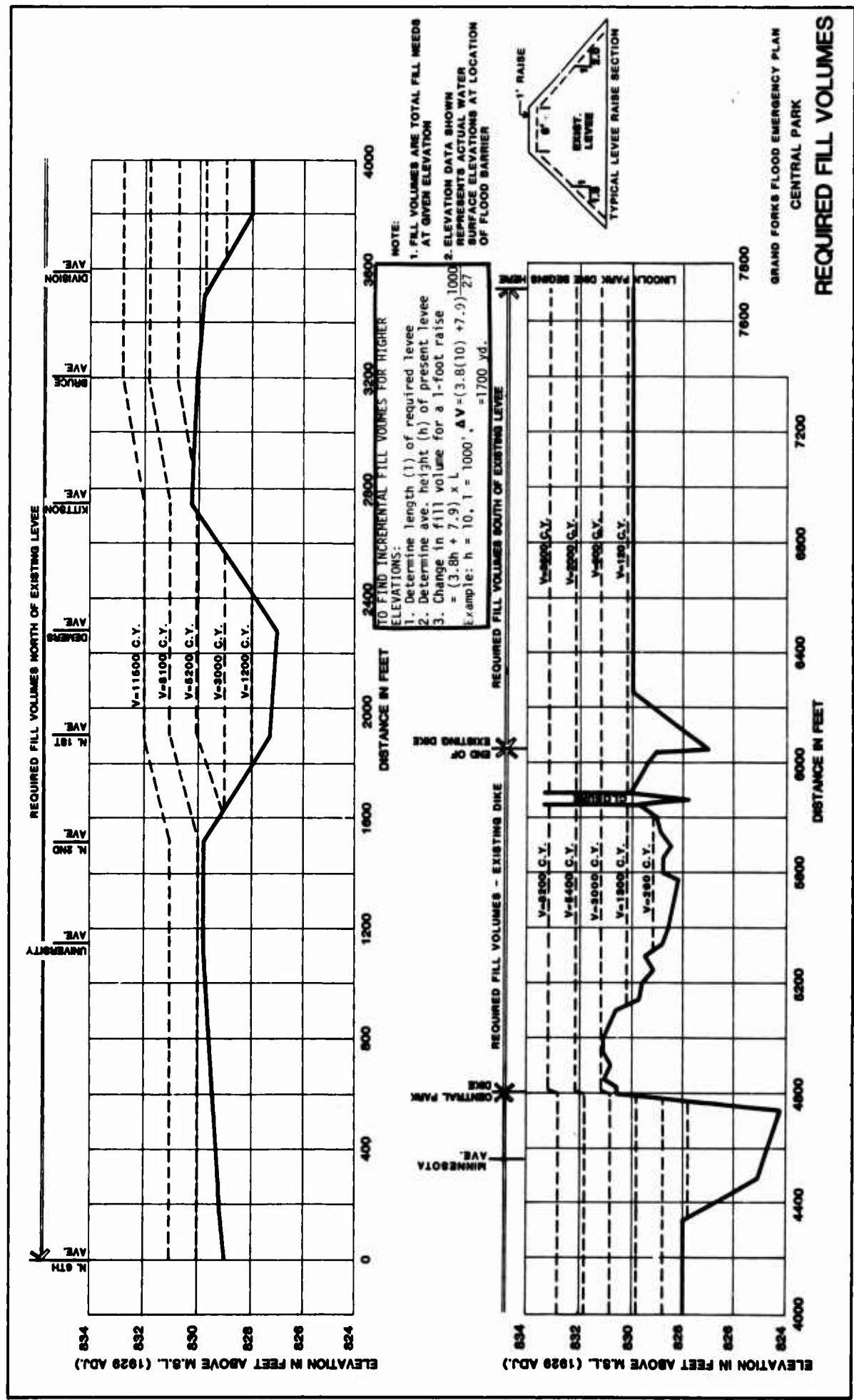
- | | |
|------|--|
| 18.0 | Pull heaters & electrical board, shut off power to outlets - Red River pumphouse - So. Almonte Ave. Pull heaters in Red Lake River pumphouse - 5th St. S. E. E.G.F. Raise heaters to top floor - Red River pumphouse #1, Timberline Court. |
| 36.2 | Close shear gate and install jacks in M.H. at Minnesota & 3rd St. (From lime sludge plant). Lime sludge to be pumped through existing submersible pumps and temporary line running through sludge plant. |
| 36.2 | Install extra long valve key on valve for intercity emergency water line - 520 S. 3rd St. |
| 48.0 | Sandbag sludge plant truck entry. |
| 48.0 | Shut down Red Lake River pumphouse - 5th St. S. E. E.G.F. Danger of water on top floor, control panel and pump motors. |

NOTE: Water Maintenance Department has 24 hour operation for pumps and sandbags, unloading, loading, problems with water service lines, broken pipes, etc.

Water Maintenance Department will need a forklift for handling sandbags in and out of the warehouse.

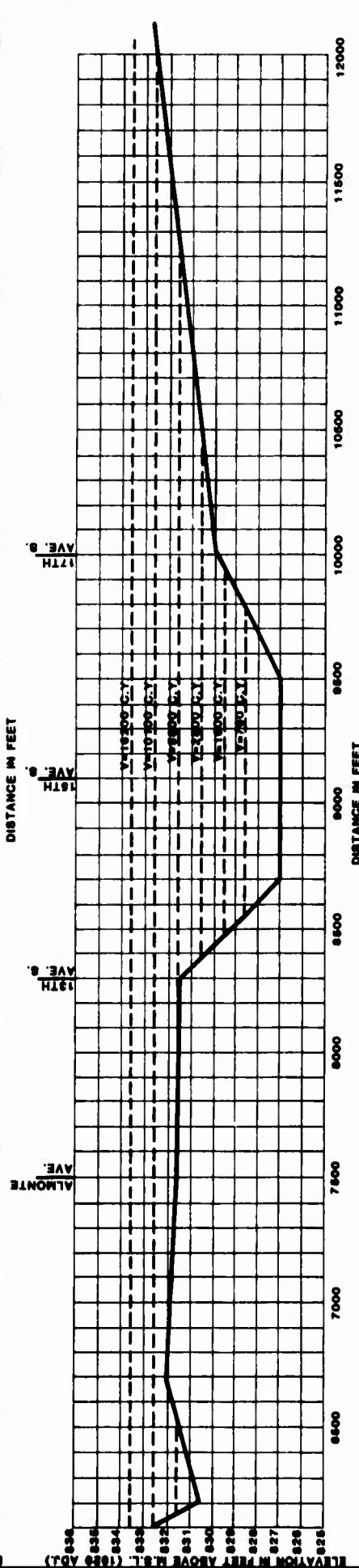
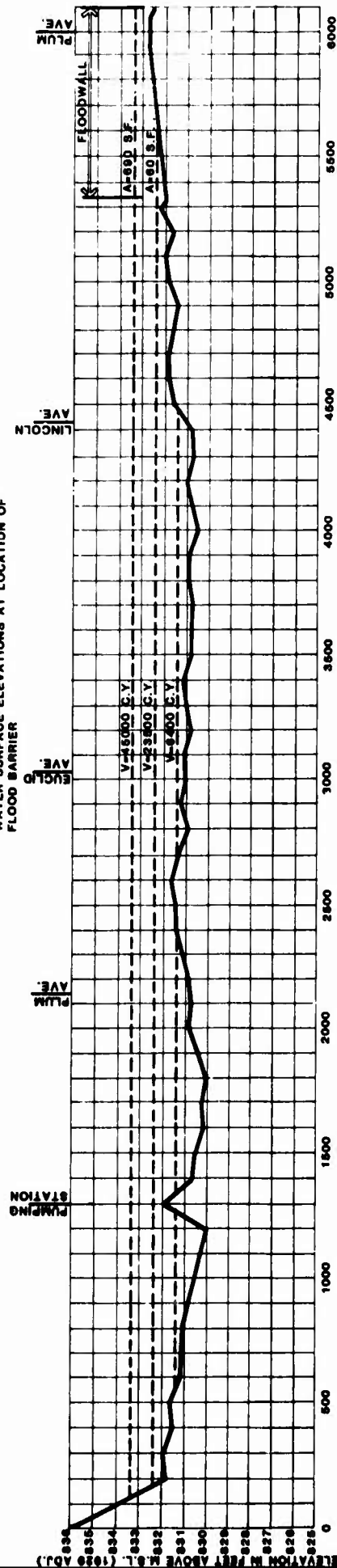
Dwight Wurzbacher
Dwight Wurzbacher, Foreman
Water Maintenance Department

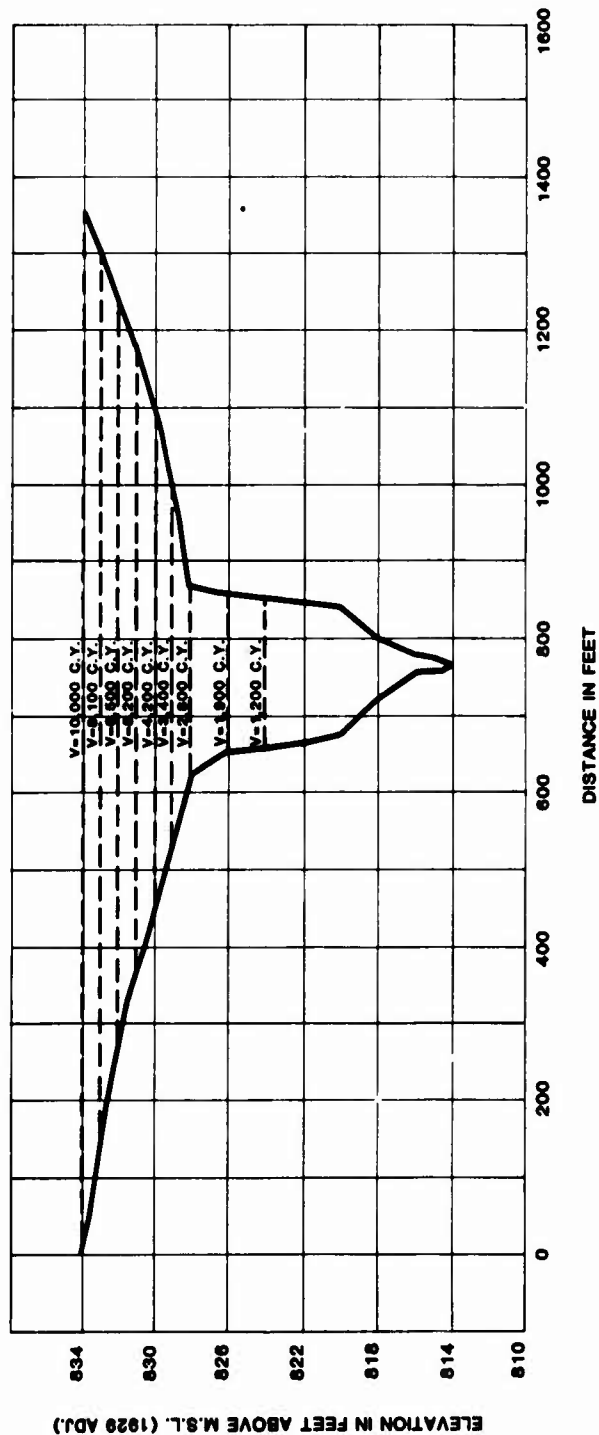




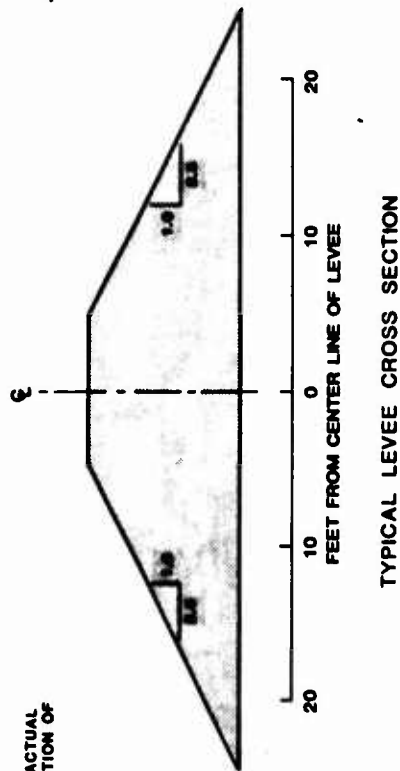
NOTES:

1. FILL VOLUMES ARE TOTAL FILL NEEDS AT GIVEN ELEVATION
2. SEE SAMPLE COMPUTATIONS ON PLATE VIII-1 FOR INCREMENTAL FILL VOLUMES FOR ELEVATIONS GREATER THAN THOSE SHOWN
3. ELEVATION DATA SHOWN REPRESENTS ACTUAL WATER SURFACE ELEVATIONS AT LOCATION OF FLOOD BARRIER





- NOTE:**
1. SEE PLATE VIN-1 FOR PROCEDURE USED TO COMPUTE LEVEE FILL NEEDS FOR LEVEE RAISES GREATER THAN THOSE SHOWN
 2. ELEVATION DATA SHOWN REPRESENTS ACTUAL WATER SURFACE ELEVATIONS AT LOCATION OF FLOOD BARRIER

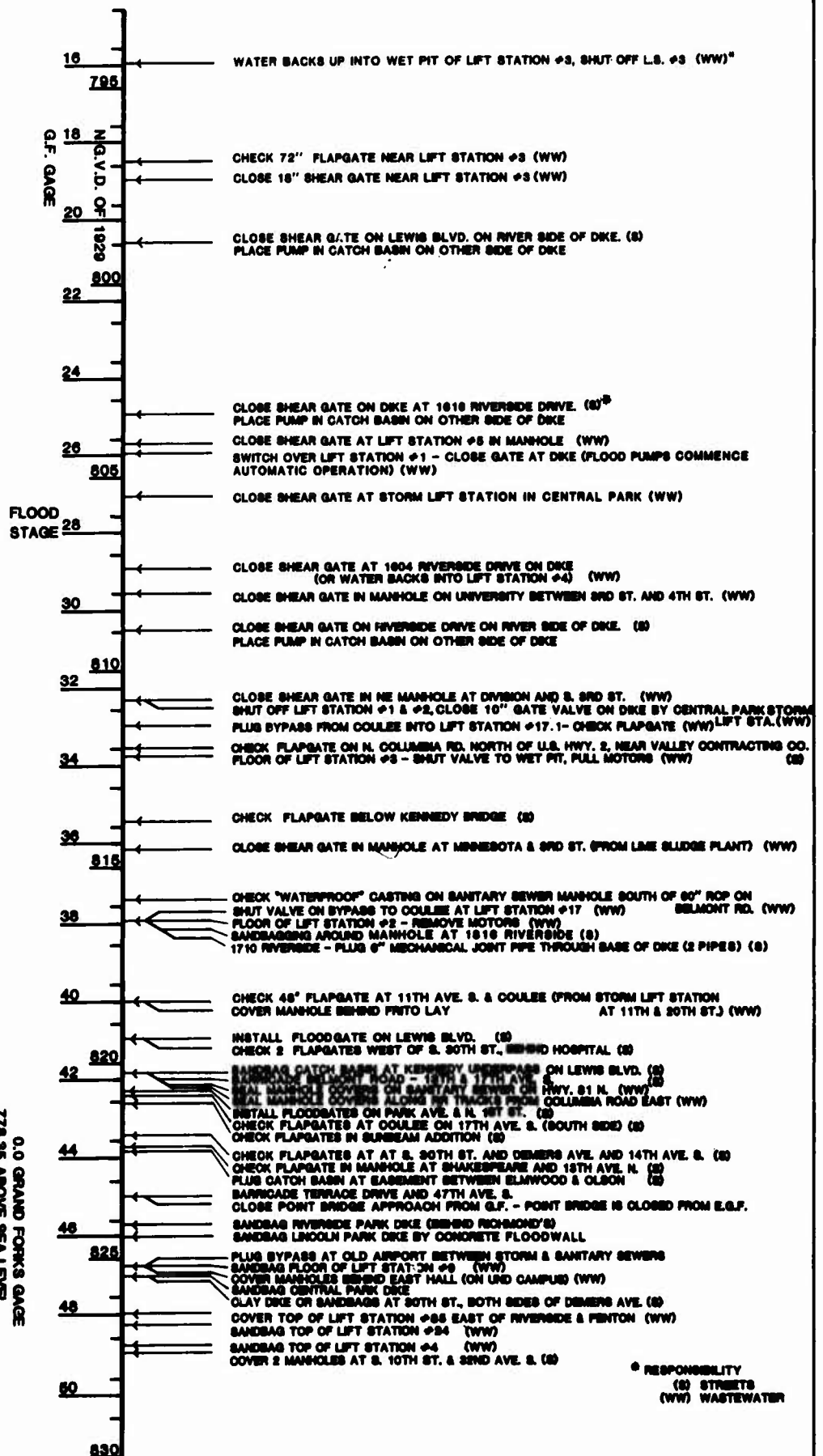


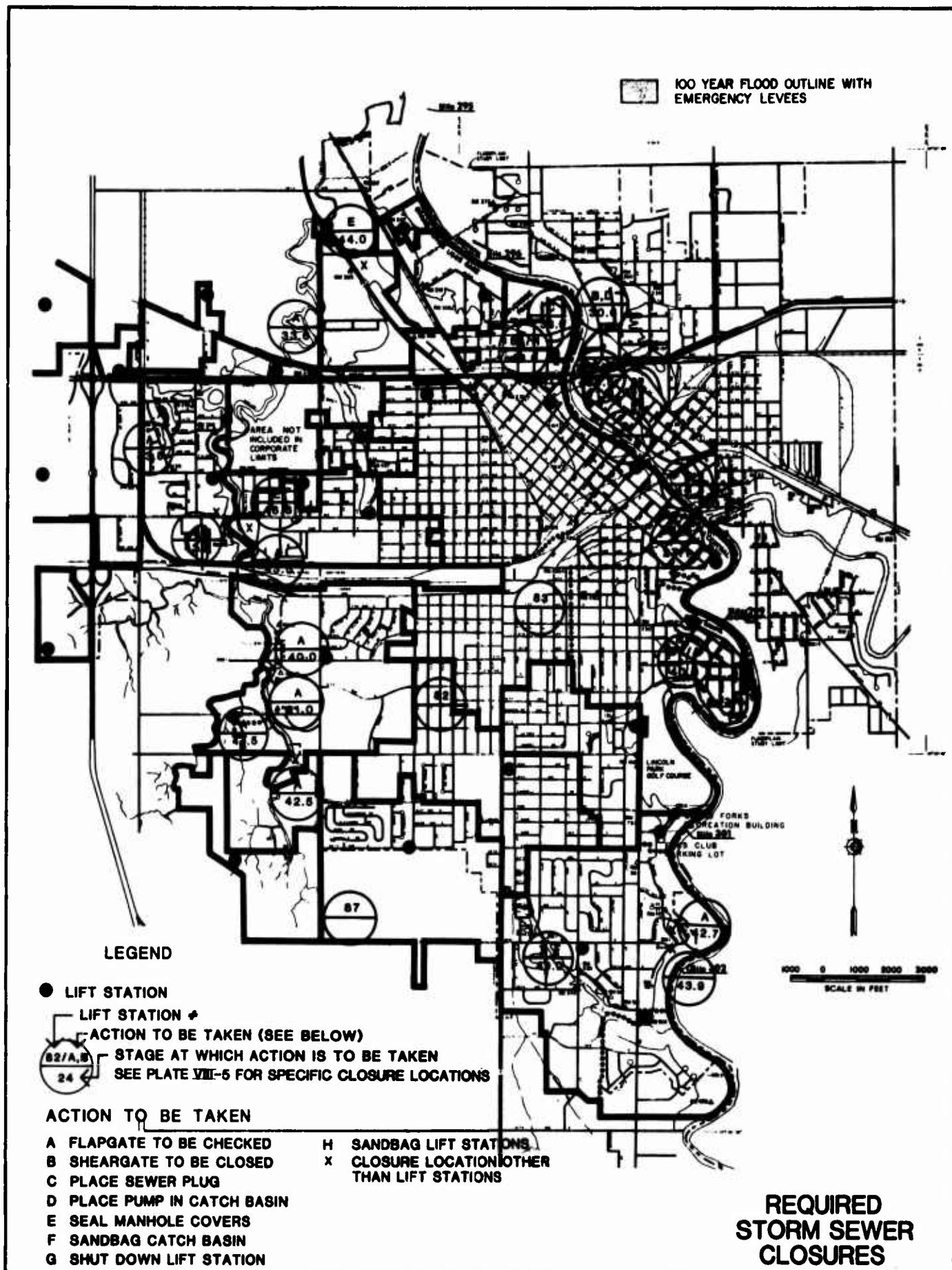
GRAND FORKS FLOOD EMERGENCY PLAN
BELMONT COULEE DIKE
**REQUIRED FILL VOLUMES
& TYPICAL LEVEE
CROSS SECTION**

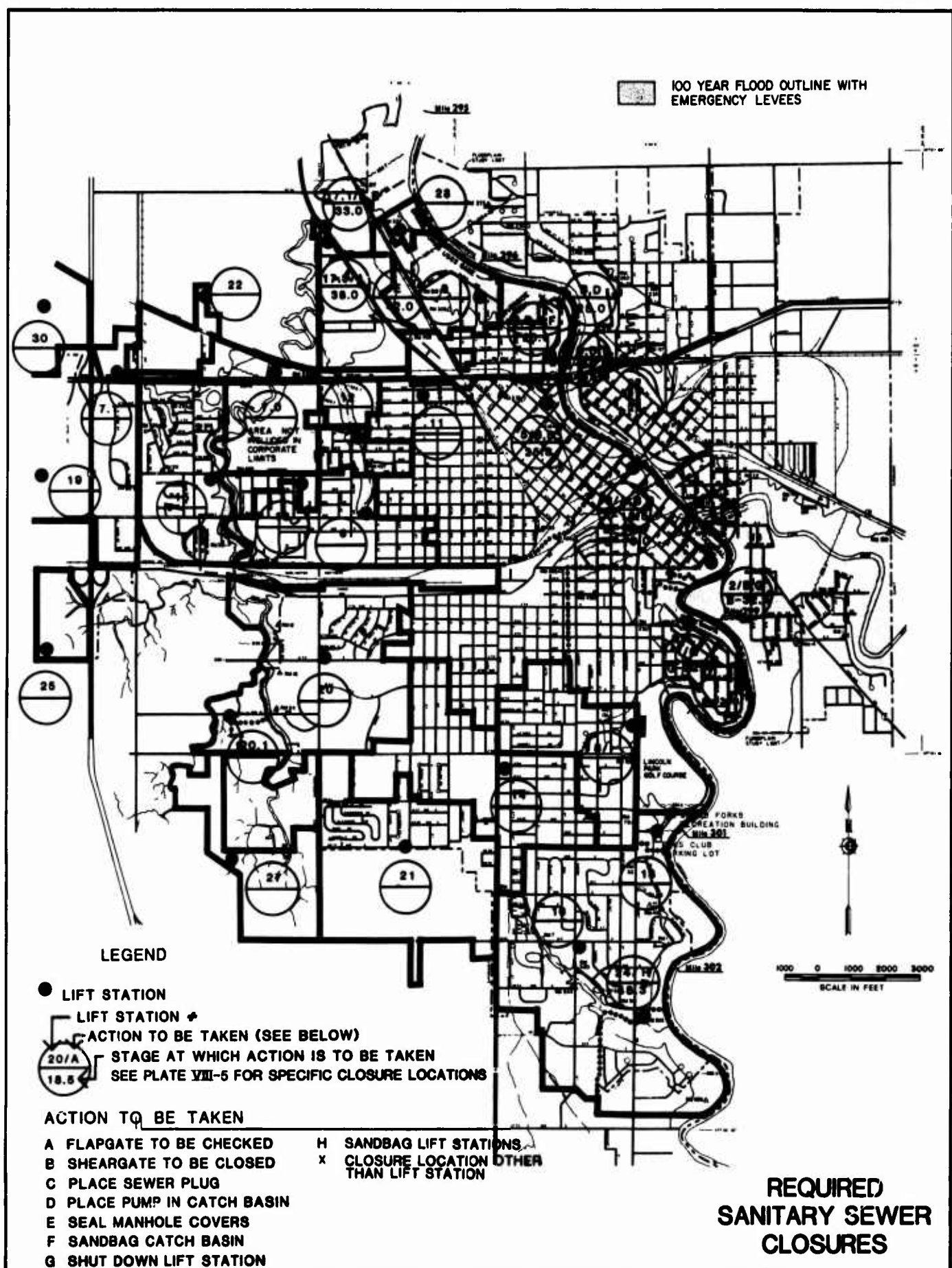
EST. PUMPING NEEDS \approx 38,000 GPM
USE 4-16" CRISAFULLI'S OR EQUAL
AS DETERMINED FROM TABLE VIII-2

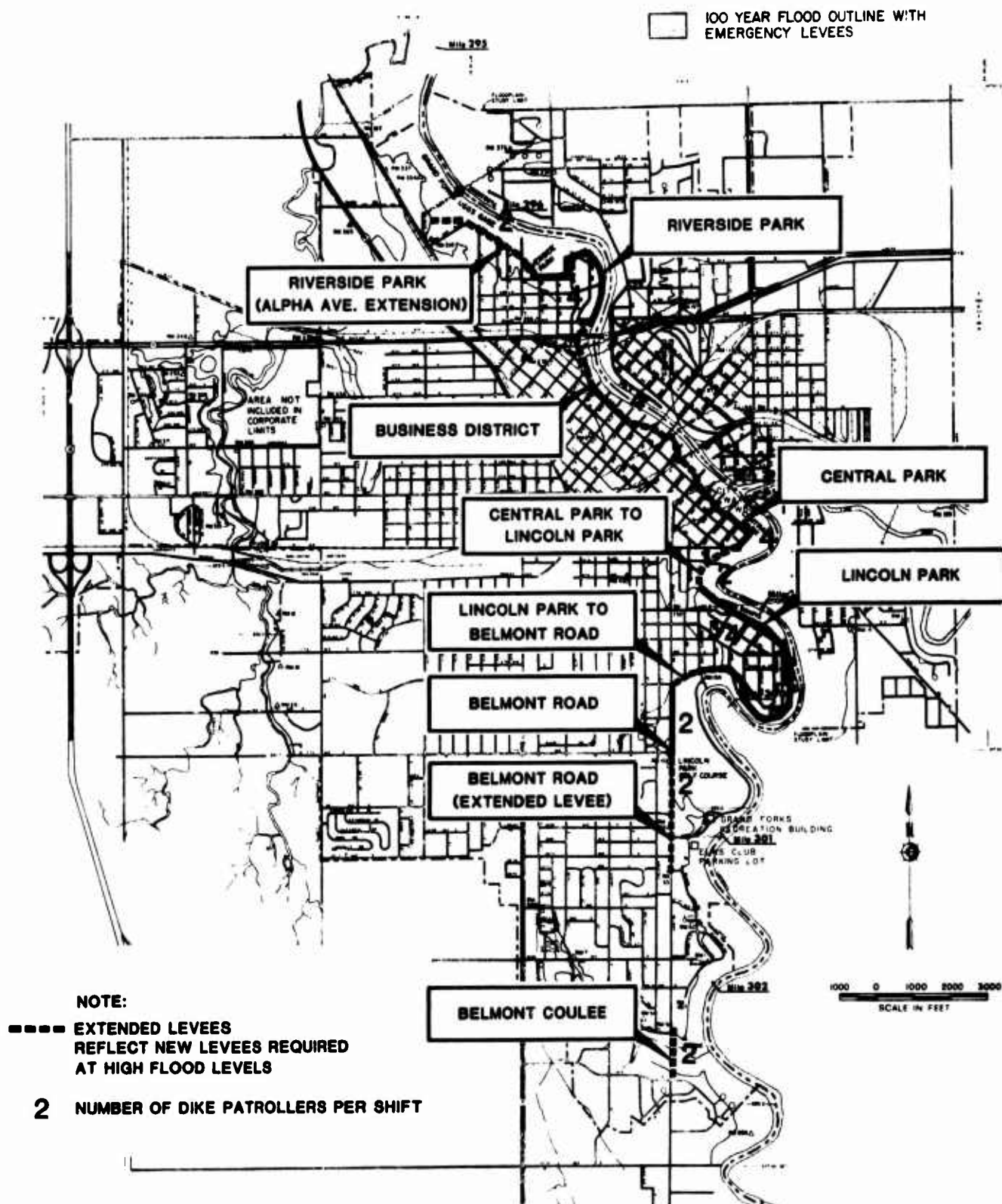
ENGINEERING ACTIVITIES WHICH MUST TAKE PLACE AT DIFFERENT RIVER ELEVATIONS

0.0 GRAND FORKS GAGE
778.35 ABOVE SEA LEVEL









GRAND FORKS FLOOD EMERGENCY PLAN
DIKE PATROL AREAS
EXISTING & EXTENDED LEVEED AREA

Grand Forks
Flood Emergency Plan of Action

Chapter IX

CONTINGENCY PLANS

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Chapter IX CONTINGENCY PLANS

GENERAL

Contingency plans are defined as any immediate action or series of actions required to meet a perceived or imminent threat. Such plans may typically include evacuation and/or emergency construction measures to meet a levee overtopping or failure situation; measures to meet unanticipated shortages or dislocations in manpower, materials, or equipment; or a general evacuation plan in the event of imminent widespread flooding.

LEVEE FAILURE

The Riverside, Central, and Lincoln Park areas are protected to varying degrees by earthen dikes or combinations of earth dikes, closures, and floodwalls (see Chapter IV). However, this is no guarantee that these devices will not fail (as a result of erosion, seepage, hasty construction, inadequate materials, etc.) during a major flood. The three flood barrier systems were analyzed to determine areas flooded (whether from levee failure or overtopping), available response times for evacuation measures, and numbers of structures and people affected.

These analyses are necessarily based on assumptions concerning the mode of failure, failure location, and availability of manpower and equipment. The principal assumptions are:

1. Overtopping of the earth levee or a failure of a section of timber floodwall is the most probable form of failure.
2. A range of failure modes from 1/2-foot depth over a 50-foot length of levee to 2 feet of head for a 100-foot length are used to predict impacts in the protected area.

3. Natural ponding areas within the protected area are available. No significant pumping capacity* is available for immediate use.
4. Adequate Dike Patrols are maintained to observe potential danger areas and promptly alert officials if failure or overtopping occurs.
5. Sufficient construction equipment and personnel are available for rapid response to a reasonable range of levee failures.
6. More serious levee failure modes would result in complete inundation of the interior areas in a relatively short period of time. Therefore, these more serious failure modes are considered reason for immediate evacuation rather than attempted levee repairs.
7. Ponding elevation curves are based on available topographic maps and street elevation data.

On the basis of the above assumptions, the rate of inflow was computed for several failure modes using a weir formula ($A = CLH^{3/2}$). The total volume of inflow to the protected area was computed for the estimated response time, and the elevation of the interior ponding was read from the storage-volume curves shown on Plates IX-1, IX-2, and IX-3. These storage-volume curves can be used to determine pumping requirements in the event that a levee failure or overtopping floods any of the three protected areas. For any given final water surface elevation in any one area and the available pumping capacity in cfs (1 cfs = approximately 450 gallons per minute), local engineering personnel can estimate the time required to lower the ponded water surface to any other selected elevation. The flooded area outlines and structures affected at the various ponding elevations are shown on aerial photographs on Plates IX-4 through IX-6. A summary of failure effects for a range of failure modes is given in Table IX-1.

* Existing pumping facilities or contemplated temporary measures would probably not be effective against a sudden rush of floodwaters due to a levee failure.

Table IX-1 - Levee Failure Effects

FAILURE MODE	RESPONSE TIME	INFLOW CFS	STORAGE AC-FT	POND ELEVATION	EFFECT BUILDING POP.	
<u>RIVERSIDE PARK AREA - TOP OF LEVEE 825.4*</u>						
H	L					
1/2' -	50'	2 hours	47	7.9	821	24
1' -	50'	4 hours	135	44	824.3	48
1' -	100'	6 hours	270	132	825+	62
4' -	6'	4 hours	130	43	824.2	48
(timb)						
<u>CENTRAL PARK - TOP OF LEVEE 829</u>						
1/2' -	50'	2 hours	47	7.9	823.5	1
1' -	50'	4 hours	135	44	828	27 + 1
1' -	100'	6 hours	270	132	829+	37
<u>LINCOLN PARK - TOP OF LEVEE 831</u>						
1/2' -	50'	2 hours	47	7.9	815.2	9
1' -	50'	4 hours	135	44	828	49
1' -	100'	6 hours	270	132	821.4	108
2' -	100'	8 hours	764	505	828.4	208

* Levee top elevations at midpoints of levee

Table IX-1 shows the elevation to which an area will be flooded for each failure mode if no corrective repair actions are taken before the end of the given response time. The pumping capacity required to remove inflows from a levee failure can be estimated as follows:

$$\text{Pumping rate (gpm)} = 450 \times [\text{inflow rate (cfs)} + (12 \times \text{storage (ac-ft)} \div \text{desired pump-out time (hours)})]$$

$$\text{Example: } 450 \times (47 + (12 \times 7.9 \div 4)) = 31,800 \text{ gpm}$$

Interpolation between the flooded area outlines on Plates IX-4 through IX-6 will give the approximate flooded area for each failure mode.

SEWER BACKUP

Severe flooding with related property damage and threats to public health and safety may result from an improper or dislodged closure or a sewer-line break. Such a development will require different actions depending on the severity of the problem. Inflow volumes are usually small enough to permit repairs, sandbag ring dikes around affected manholes, and/or evacuation of nearby residences. Where these temporary measures are inadequate, a backup or secondary levee should be constructed landward of the sewer outflow point and all structures not protected by this secondary line of protection should be evacuated.

MANPOWER, MATERIAL, AND EQUIPMENT SHORTAGES AND DISLOCATIONS

During a severe flood emergency, the temporary shortage or dislocation of manpower, equipment, and materials may present problems in meeting emergency construction needs. Manpower and equipment shortages can be resolved by early planning and timely acquisition of volunteers and volunteer equipment. Additional manpower and equipment may also be obtained at local request and with State approval from the Army and Air National Guard.

Material shortages, particularly earth fill, could pose a greater problem if sources of supply are cut off or otherwise rendered unusable because of flooding. Alternate sources must be then used. Minimum controlling access road elevations to local borrow areas are shown on Table VII-4 in Chapter VII.

GENERAL EVACUATION

Evacuation of an area or warning of a possible evacuation may be required for any of several reasons, such as an imminent dike failure or overtopping, a serious sewer backup, a determination by the Police and/or Fire Chief that they can no longer protect or provide services to an area because of flooded streets or any other situation which, in the judgment of the Mayor, is sufficiently hazardous to require warning to evacuate.

The geographical area to be warned or evacuated shall be determined by the Director of Public Works. The actual evacuated area should be limited to only that area that is perceived to be in danger to avoid overtaxing temporary lodging and feeding facilities. The flooded area maps shown on Plates IX-4 through IX-6 may be used to determine the area(s) to be evacuated on the basis of prevailing field conditions and/or imminent levee failure possibilities.

An evacuation warning or actual evacuation can be chaotic and produce panic; therefore, these actions should be considered only when there is reasonable doubt concerning the city's ability to protect the affected population. The use of a phased plan for initiating an evacuation will lessen the confusion that might result if evacuation became necessary.

INITIATION CRITERIA

The criteria and decisions leading to an evacuation warning and actual evacuation will be similar in many ways to the criteria for initiating an emergency flood fight. The evacuation warning and plan consists

of five phases. No evacuation activity beyond Phase I will be instigated without the approval of the Mayor or his designee. In their absence or incapacity, authority to issue warnings or order an evacuation will rest with the Civil Preparedness Director, the Director of Public Works, the EOC Commander, or the Chief of Police, in descending order.

Phase I

Phase I is a generalized warning to the citizens of Grand Forks and environs through the media by the Mayor or Civil Preparedness Director. It should be given shortly after the EOC is activated. The first news conference can provide the standard background statement covering the EOC activation, phone numbers, mission, and other information directed to persons living in flood prone areas. This latter information would include instructions on moving furniture or appliances out of the basement, acquiring sewer plugs and plumbing caps, and establishing a furniture depository (Grand Forks Arena) if then available. A list of actions which residents should be advised to be prepared for include:

1. Heating -- Prepare to:
 - a. Turn off electrical power to heating plant.
 - b. Remove all electrical equipment (motors and controls) from heating plant and store out of flood area.
 - c. Shut off gas service at gas meter.
 - d. Brace or anchor oil storage tank to prevent floating.
Shut off oil piping at oil tank.

2. Other

- a. Remove all articles that float - freezers, refrigerators, washers, dryers, furniture, etc. - from the flood area.
- b. Disconnect plumbing fixtures and plug or cap all waste and water lines; flood basement with fresh water.

Additional information on the necessary procedures for securing electrical heating and plumbing facilities in buildings threatened with flooding is given in Appendix 2 to this manual.

Phase II

Phase II is an oral and/or written warning personally given to all persons in a defined threatened area. Some feedback to the EOC from those warned persons is expected. The Police Department has the primary responsibility for giving these warnings. The text of the warning will be provided by the EOC. It should be simple, such as "If the river stage reaches 40 feet, this area will have to be evacuated. You will be given adequate warning if this occurs." The media should be notified of the delivery of these warnings at the next regularly scheduled news conference.

Use of Phase II normally indicates that a firm decision has been reached to evacuate a specific area contingent upon the occurrence of a specific event, such as a rise in water level to a predetermined point or a possible levee failure.

Phase III

Phase III consists of the evacuation of a previously warned population. As a result of the Phase II warning, the evacuation should be orderly. Personal notice of the evacuation order shall be given by the Police

Department to all affected citizens, who at the same time, shall receive a copy of the Evacuation Information Form (see Figure IX-1). Notice of the evacuation order shall be given to the media, including Cable TV, via the "hot lines." Notice to the newspaper can be telephoned directly. Media information shall include notice that no one shall be permitted in the evacuated area without a pass, and that qualified applicants may receive a pass from the EOC (see discussion in Chapter VI regarding restricted area pass designations). A sample Disaster Area Pass application form is shown on Figure IX-2. A sample pass is shown on Figure IX-3. The Police Department shall set up a security system in the evacuated areas.

It is presumed that, because of the planned nature of the evacuation during these phases, it would occur during daylight hours. Late afternoon, when entire families are home, would be the best time.

Phase IV

Phase IV is, for all practical purposes, the simultaneous execution of Phases II and III. The evacuated area will be canvassed by the Police Department and the Mobile Command Posts (if the MCPs are available). The Evacuation Information Forms will be distributed, with special attention called to the deadline. The reason for the evacuation should be given -- an alarming rise in the water level, excessive stress on a levee, etc. Sirens and/or loudspeakers will not be used. The media shall be notified via the telephone "hot lines" from the EOC. Considerable feedback to the EOC is expected. A security and restricted area pass system will be established immediately.

Phase V

Phase V is the immediate evacuation of a largely unwarned population as a result of a sudden levee failure or other catastrophe. Confusion

EVACUATION INFORMATION FORM

All buildings in this area must be evacuated by _____ AM PM
_____, 19_____.

If you have no place to go, please go to the Valley Junior High School, 6th Avenue North and North 20th Street, and you will be cared for. Please take personal items with you. Pets must be taken to a commercial boarding facility or to the Humane Society on Highway 2 West across from Westgate Motors.

If your sewers and drains are not plugged or capped, please have your plumber do it or take care of it yourself if time permits.

Turn off the fuel supply to your furnace; your gas supply, if any; and your electrical power at the service entrance (fusebox).

Close and lock all windows and exterior doors.

Please notify the City of Grand Forks Emergency Operations Center when you are resettled or if you require assistance.

775-3809, 775-3831, or 775-3832

THE POLICE DEPARTMENT WILL BE PROVIDING STRICT SECURITY IN THIS AREA. VEHICLE AND PERSONAL PASSES WILL BE REQUIRED.

Figure IX-1

DISASTER AREA PASS APPLICATION

TIME PERMIT ISSUED: _____ **DATE:** _____

Head of Household: _____

Address: _____

Telephone No. _____

List address and telephone number where you are staying during the emergency:

List address and telephone number where you are employed:

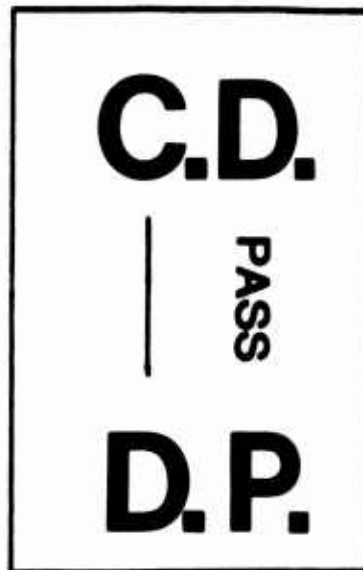
Names of other persons living in your house:

Signature

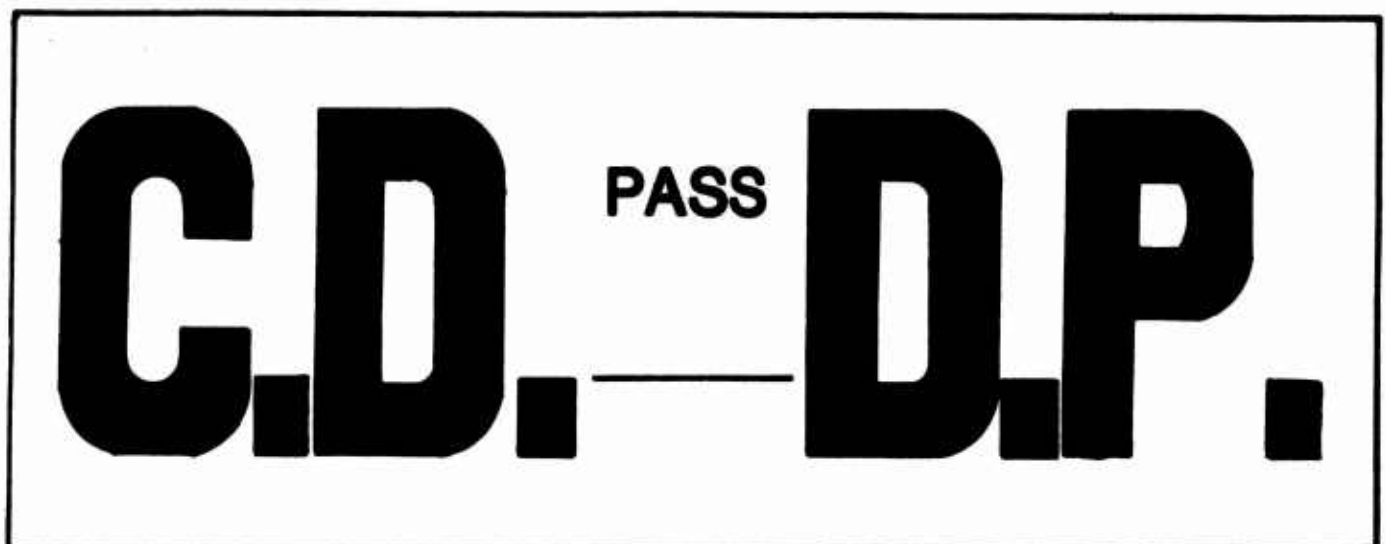
THIS PASS IS NOT TRANSFERABLE

Figure IX-2

IX-10



**PASS
FOR INDIVIDUALS**



**PASS
FOR VEHICLES**

**Figure 1x-3
IX-11**

and some panic are possible. If the surveillance and communications systems are operated properly, this phase will hopefully never be used. The sequence of events for this phase would be:

1. Notification to the EOC by Dike Patrol personnel, engineering personnel, or others of an event requiring immediate evacuation of an area which may not be precisely defined.
2. Immediate notification of the media via the telephone "hot lines" at the EOC.
3. Immediate dispatch of Police and Fire Department vehicles, including the MCPs, who shall use vehicle sirens⁽¹⁾ and loudspeakers to alert the population. The direction in which to flee shall be given over the loudspeakers.
4. Physical "banging on doors" if time and conditions permit by Police and Fire Department personnel, who will very briefly explain the situation and the direction in which to go to get to buses or other emergency vehicles.
5. The dispatch of one or more buses to the adjacent flood-free high ground area judged to be most suitable for picking up the residents of the evacuated area.

The buses can be diverted from the sandbaggers transport detail. The Fire Department also has one bus available if needed. Buses should be routed to Valley Junior High School, where the Red Cross will be operating a temporary lodging and feeding station. The Red Cross should be notified immediately that the evacuation is in progress.

(1) Because of our inability to selectively activate the city's Civil Defense sirens, it is recommended that they not be used.

Manpower and equipment (vehicles), assistance for the evacuation of the elderly and handicapped will be available on a first call-first served basis from the EOC. However, it will be the responsibility of individual citizens to evacuate themselves whenever possible.

Available warning time is, of course, the determining factor in the evacuation phase selection. The following table is provided to put this in perspective.

PHASE	ASSUMED WARNING TIME AVAILABLE
I	3 or more days
II	1 to 3 days
III	up to 1 day
IV	hours
V	minutes

EVACUATION ZONES

Although it is difficult to predict the nature of an emergency requiring an evacuation, it is possible in the early phases of an evacuation plan to at least approximately determine the area expected to be flooded. The flooded area outlines shown by expected maximum water surface elevation on Plates IX-4 through IX-6 are useful in determining the area(s) to be evacuated.

EVACUATION ROUTES

During major floods, several routes will be impassable as a result of deep water. Flooded thoroughfares will include the English Coulee crossings of U.S. Highway 2, University Avenue, DeMers Avenue, 17th Avenue South, and 32nd Avenue South. Columbia Road will also be flooded just north of U.S. Highway 2 and between DeMers Avenue and 11th Avenue South. Belmont Road will be closed between 13th and 17th Avenues South during major Red River of the North floods. Thus, alternative evacuation routes must be clearly described to area residents through

the local news media. For a limited evacuation (less than 50.0-foot flood stage) and no failure of flood barriers, evacuees would use undesignated streets to reach shelter areas in high ground areas. For a mass evacuation ordered due to an imminent levee failure or predicted flood crest in excess of maximum practical flood barrier heights, designated routes would be used. Evacuating residents from the Red River of the North and English Coulee floodplains north of DeMers Avenue would be directed westward to the Grand Forks Air Force Base via University Avenue. A temporary earthen fill with a gravelled surface will be required across the English Coulee bridge crossing between Yale Drive and Princeton when the predicted stage (at USGS gage) is in excess of 49.5. Additional roadway fill will be required along University Avenue between North 23rd and 26th Streets when the predicted flood crest is in excess of 50.5 feet.

All evacuation traffic from the flood-prone areas south of DeMers Avenue would be directed westward to I-29 via South Washington Street and 32nd Avenue South. A temporary gravel-surfaced earthen fill would be required along 32nd Avenue South between Columbia Road and I-29 when major flood along the upper English Coulee is predicted. A map of the city showing the designated principal evacuation routes is shown on Plate IX-7. Also shown on this plate is the extent of roadway flooding (referenced to USGS gage) at selected areas. The average depth of flooding at each of these areas is also shown.

This plate should be furnished to local news media for dissemination to the public during Phase I. The Police Department, assisted by others (National Guard, etc.) as needed, will provide traffic control on the evacuation routes during an ordered or unplanned evacuation to eliminate confusion, control unnecessary traffic, and permit a fast and safe exodus from threatened areas. In the event that temporary roadway fills are required, these personnel will also assist residents in the crossing of these areas.

Transportation of Evacuees

It is assumed that most citizens would provide their own transportation under a Phase III or IV evacuation. If transportation is requested of the EOC, the following facilities should be used:

1. For healthy individuals or families, use:
 - a. Police Department - sedan, if available 772-7171
 - b. Mobile Command Posts Radio
 - c. American Red Cross - station wagon or private sedan Days: 772-2411
772-4781
After hours: 772-0828
773-2971
 - d. Quad County Community Action Agency - private cars on a voluntary basis Days: 746-5431
After hours: 775-2317,
775-3593
775-2548
 - e. Fire Department - rescue van, if available, also a bus
 - f. Sandbaggers' bus Armory
 - g. Dietrich Bus Company Days: 772-0601
 - h. Commercial taxi service
 - i. Unused city bus
2. Transportation vehicle for handicapped persons
 - a. United Hospital ambulance 780-5280
Also 911, or Alpha I
on KAB-623
 - b. Rehabilitation Hospital - vans equipped 772-8141
for handling wheelchairs ext. 231
If no driver on duty, call: Rocky Clemenson 746-5747
Arlo Swedberg 746-5102
Dave Helmer 775-7409
Randy Mantovani 772-6717

If serious delays will occur because no driver is available for the ReHab van, wheelchairs can be manually loaded into the Fire Department rescue van.

3. Transportation, pets

- a. If necessary, the animal warden's van operated by the Police Department can be used 772-7171
- b. Commercial pet boarding facilities:
 - Merrifield - dogs and cats only 599-2005
 - Manvel - all pets 696-2573
 - Forx Veterinary Clinic - cats only 772-7289
 - Humane Society - all pets 775-3732
 - After hours: Catherine Brea 772-0617
 - Shelley Olson 746-5112
 - Evelyn Horton 746-5780

4. Mentally and physically healthy people can be taken directly to Valley Junior High School if they have no place to go. If this facility is unavailable, contact the Red Cross or the Salvation Army for the temporary lodging and feeding facility then in use.

5. Persons requiring custodial care of some sort should be taken to either Valley Memorial Home or Tufte Manor.
- | | |
|---------------|----------|
| After hours: | 772-4815 |
| Paul Opgrande | 772-3609 |
| JoAnn Hurley | 775-8048 |
| Len Schroeder | 772-2893 |

EVACUEE REGISTRATION

All evacuees transported to a temporary shelter will be required to fill out a registration form. This form (see Figure IX-4) includes data, such as names of evacuated family members living at evacuated residence, address, and illnesses or disabilities requiring special medical treatment. The known or presumed whereabouts of family members not in the residence at the time of evacuation should be indicated. Information on utility hookups, appliances, and any potential hazards of which the Fire or Police Department should be informed is needed. It is expected that a Red Cross volunteer will be in charge of this registration process.

EVACUEE ASSISTANCE

In addition to transportation assistance, evacuees may require housing, feeding, medical care, counseling, and advice and/or assistance in the postflood cleanup of their homes. Local Human Service Agencies which can provide this assistance are:

Table II-2 - List of Human Services Agencies

(1) GRAND FORKS COUNTY SOCIAL SERVICES

Provides direct welfare, food stamps, registered day care for children, referral service

Days: 772-8171

After hours: Clarence Ohlsen, 772-5297
Dave Braaten, 775-0407

(2) QUAD-COUNTY COMMUNITY ACTION AGENCY

Works largely with low-income families through a variety of programs; in an emergency, it can be called on to furnish transportation for individuals or families.

Days: 746-5431

After hours: Mike, 775-2317; Kent, 775-3593

(3) AREA SOCIAL SERVICE CENTER - Counselling

Days: 777-3881

After hours: Kevin Coler, 772-1726
Glenn Lian, 772-3650

(4) CENTER FOR HUMAN DEVELOPMENT - Mental Health Center

Days: 775-0525

After hours: Dr. Lindenfeld, 746-6250

(5) AMERICAN RED CROSS

Temporary food and lodging, clothing, blankets, other disaster services.

Days: 772-2411 or 772-4781

After hours: Lu Jensen, 772-0828
Ken Stennes, 773-2971
Abe Muscari, 775-0159

EVACUEE REGISTRATION FORM

Last Name: _____ (Please Print) Street and
Number: _____
Phone: _____

Family Members
Living at Residence
(First Name)

Age

Illness or Disability
Requiring Special
Medical Treatment

Family Members in
Area but not at
Residence or at Shelter

Known or
Presumed
Where-
Abouts

Other Nearby Relatives in
Evacuated Area

(Name)

(Address)

Personal Items Brought Into Shelter (Food, medicine, blankets, etc.)

Condition of Residence

Sewer plugged?
Electricity disconnected?
Furnace shut off?
Appliances disconnected?
Gas shut off?
Any pets left at home?
Other hazards which Fire or Police officials should know about?

FIGURE IX-4

IX-18

(6) SALVATION ARMY

Temporary shelter, food, clothing, immediate needs.
Telephone: 775-2597, always answered - Lt. Gauthier

(7) MENNONITE DISASTER RELIEF

Cleanup and minor repair assistance to damaged homes. No charge. Crew furnishes tools and subsistence. Can be quartered in Wesley Methodist Church of this city - 772-1869. The area coordinator is Mr. Alvin Bontrager, Box 421, Bemidji, Minnesota 56601

Days: 1-218-751-9344;

After hours: 1-218-835-6485

Temporary Storage Facilities

Evacuees may wish to temporarily store their household furniture and other belongings. The Grand Forks City Arena at 1122 Seventh Avenue South is available for this storage. All persons storing possessions at this facility will be required to sign a Indemnity and Hold Harmless Agreement (See Figure IX-5 for sample).

Housing and Feeding

Many of the evacuees will seek shelter with friends and relatives. All others will initially be housed at the Valley Junior High School, located on 17th Avenue South. If additional housing is needed, residents will be taken to the Wesley Center. For a large scale evacuation exceeding the capacity of these facilities, evacuated residents will be directed to temporary housing and feeding facilities at the Grand Forks Air Force Base. Housing and feeding facilities will be provided by the Red Cross and Salvation Army.

Medical Care

Medical care for evacuees requiring such assistance will include first-aid assistance by trained Red Cross personnel and nurses from the city's Health Department.

Postflood Assistance

Upon returning to flooded homes, many residents will be shocked by the filth, damage, and general state of disrepair of their homes. Prompt action will be required to save as many of their furnishings and belongings as possible. The EOC should advise all evacuees through the news media of the proper procedures to follow upon returning to their homes. Some important steps that evacuees should take are:

1. Check with proper city officials (Public Works, Engineering, and Health Departments) to see if it is safe to return to their homes.
2. Be sure gas had been shut off. Enter with caution. Do not smoke. Let the house air out.
3. Do not turn electricity back on. It may have become short-circuited.
4. Take as many photographs as possible of damaged areas in the home for legal proof of damage. This can be very helpful later for purposes of insurance, loan applications, etc.

The EOC has very helpful literature available, free of charge, regarding:

- "Tips on Repairing Your Disaster Damaged Home"
- "Don't Be The Victim of a Post-Flood Rip-Off"
- "When You Return To a Storm Damaged Home"

This literature includes items on how best to dry and clean; check electrical systems and heating plants; disinfect water supply; combat odor; repair floors, woodwork, doors, locks, and hinges; remove surface mold and mildew; and salvage furniture. This literature is highly recommended for people who have had their homes damaged by floodwaters.

INDEMNITY AND HOLD HARMLESS AGREEMENT

I, _____, having a current post office address of _____, am the OWNER or LEGALLY AUTHORIZED AGENT OF THE OWNER (Cross out one) of a threatened building having the address of _____, Grand Forks, North Dakota, and I hereby agree to indemnify and hold harmless the City of Grand Forks, North Dakota, and its officers, agents and employees, from and against all claims, damages, losses and expenses, including reasonable attorney's fees (in the event it shall be necessary to file or defend an action) for bodily injury, illness or death, or for property damage, including loss of use, arising out of and in any way connected with the purposeful flooding of the basement of the above referenced threatened building.

This agreement shall be effective on _____ : AM PM (Cross out one) _____, 19____ and shall continue in full force and effect until the purposeful flooding, and the effect thereof, ceases.

Dated this _____ day of _____, 19____.

Witnessed: _____ OWNER AGENT
(Cross out one)

Witnessed: _____

NO BASEMENTS SHALL BE FLOODED BY THE GRAND FORKS FIRE DEPARTMENT WITHOUT A SIGNED AGREEMENT. THE UTILITY COMPANY MUST CUT SERVICE TO THE BUILDING BEFORE FLOODING IS COMMENCED.

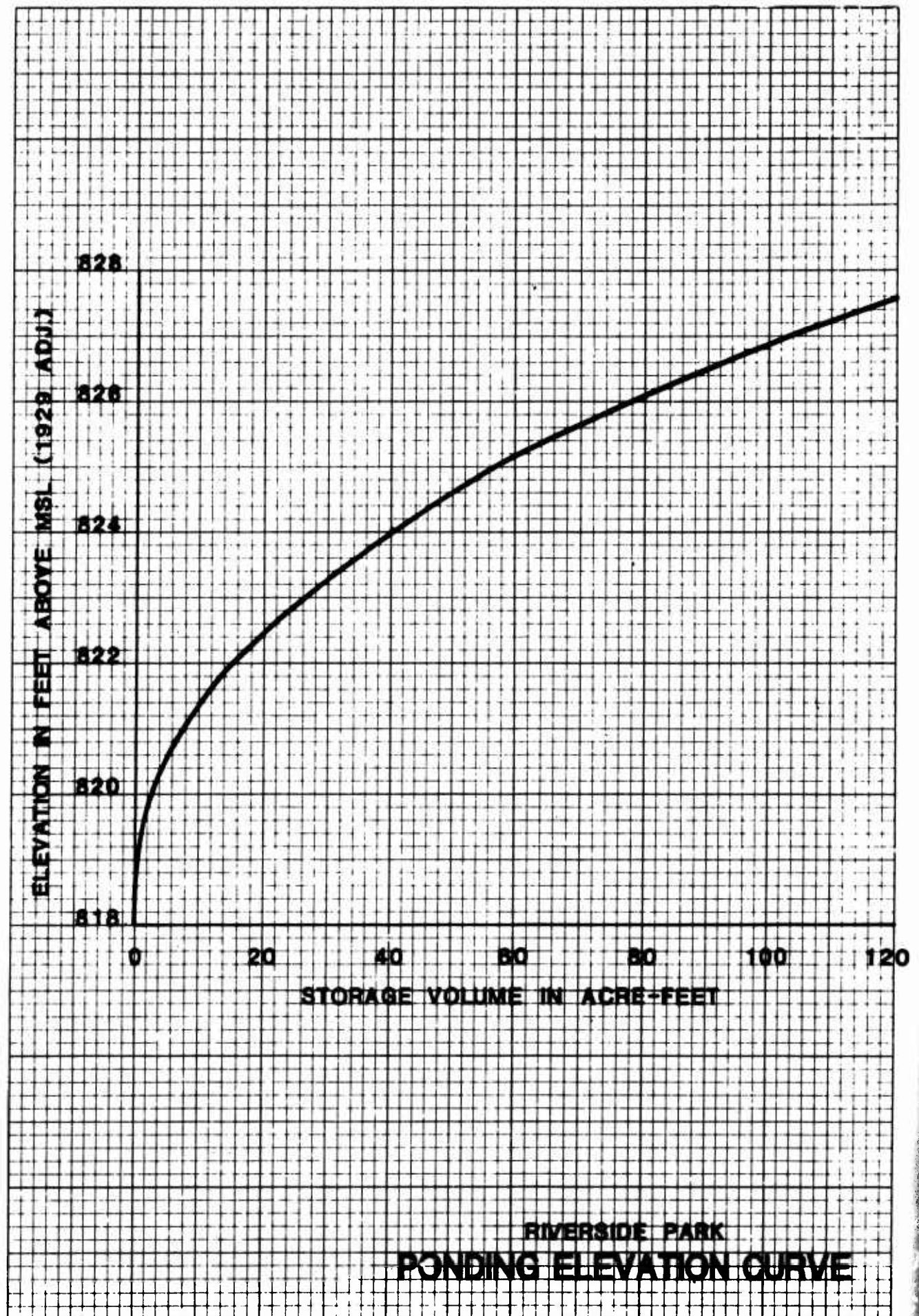
MORTUARY SERVICES

In the event that some unforeseen situation results in a major catastrophe with loss of life, emergency mortuary services would be required. The EOC commander, in close coordination with the National Guard and American Red Cross, would coordinate all retrieval and temporary disposal efforts. The National Guard (see Chapter II) can provide vehicles and manpower for the retrieval, transportation, and identification of dead persons. It is expected that local funeral homes would provide assistance and facilities for the proper identification and preparation of dead persons. A list of area funeral homes which can be alerted if the need should arise is as follows:

<u>Name</u>	<u>Address</u>	<u>Telephone No.</u>
Amundson Funeral Home	3015 South 42nd Street	772-7070 Res. 775-4882
Anderson-Hanson Mortuary	115 South 5th Street	775-4361
Norman Funeral Home	Hwy 220 and 14th Avenue East East Grand Forks	772-3403
	1425 Columbia Road Grand Forks	772-3403
Stennes Funeral Home	1401 Central Avenue Northwest East Grand Forks	773-2971

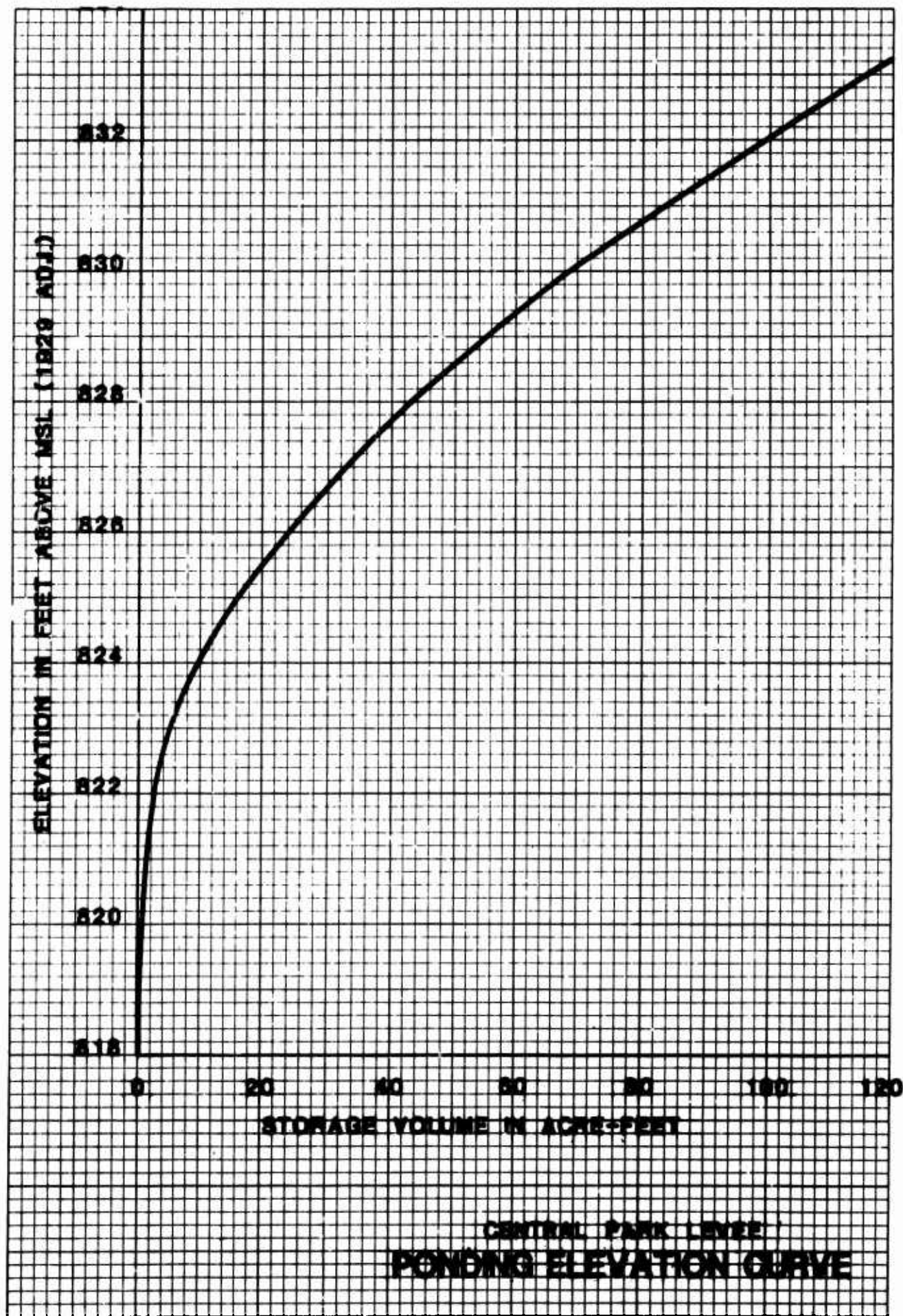
DIETZGEN CORPORATION
MADE IN U.S.A.

NO. 341-10 DIETZGEN GRAPH PAPER
10 X 10 PER INCH



DIETZGEN CORPORATION
MADE IN U.S.A.

NO. 341-10 DIETZGEN GRAPH PAPER
10 X 10 PER INCH



CENTRAL PARK LEVEE
PONDING ELEVATION CURVE

PLATE IX-2

DIETZGEN CORPORATION
MADE IN U.S.A.

NO. 341-10 DIETZGEN GRAPH PAPER
10 X 10 PER INCH

830

828

826

824

822

820

818

816

814

812

ELEVATION IN FEET ABOVE MSL (1929 ADJ.)

LINCOLN PARK
PONDING ELEVATION CURVE

STORAGE VOLUME IN ACRE-FEET

0

100

200

300

400

500

600

700

PLATE IX-3







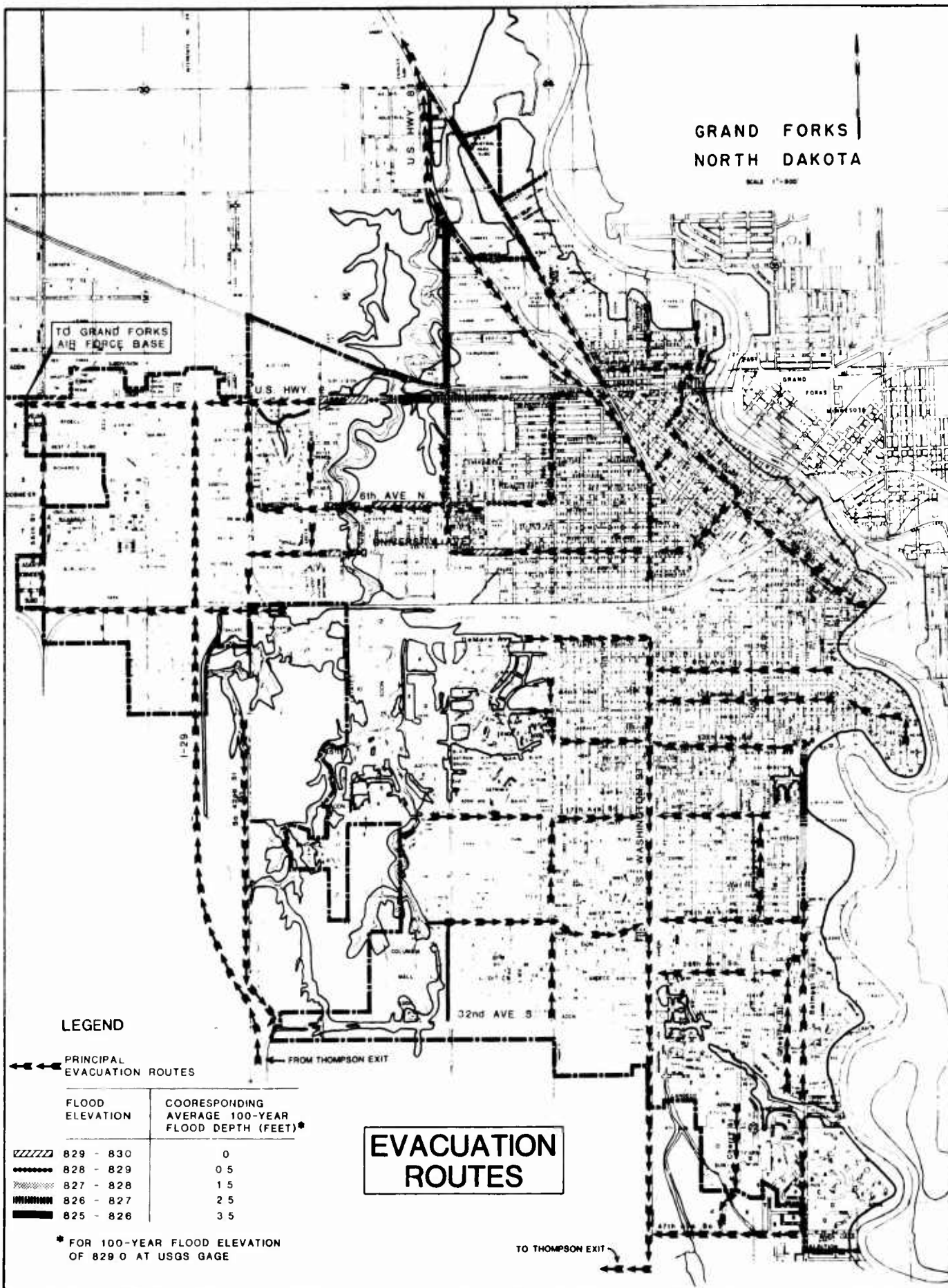
FLOODED AREAS

RESULTING FROM LEVEE FAILURE

PLATE IX-6

GRAND FORKS NORTH DAKOTA

SCALE 1"=500'



Grand Forks
Flood Emergency Plan of Action

Chapter X

POSTFLOOD ACTIVITIES

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Flood Damage Estimates and Costs of Flood Fight Cleanup	X-1
EOC Deactivation	X-2

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<u>Figure No.</u>	<u>Title</u>	<u>Page</u>
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Chapter X



POSTFLOOD ACTIVITIES

The period following the flood crest and a major flood fight is critical and as important as the flood fight. Sound general procedures for reentry and recovery of flooded areas should be considered and followed for an orderly return to normal. Postflood activities to be undertaken by the city should include provisions for:

1. Inspection of Flood Barriers and Evacuated Areas - Before residents are allowed to return to evacuated areas, an inspection of buildings and utilities should be made by the Fire Department and approval obtained for reoccupation. Residents who cannot reoccupy their homes should be encouraged to remain in public shelters until temporary housing is found. All flood barriers should be inspected, as-built data recorded, and any failure or damage conditions noted.
2. Flood Damage Estimates and Costs of Flood Fight - Damage surveys should be made promptly to discover the extent of damages and provide a basis for claims or for requesting additional State or Federal aid. Photo documentation of all damaged facilities should be made. Accurate records of local government expenditures for flood-related efforts should be compiled and kept for possible future reimbursement. A sample form to be used in recording flood damages is given in Figure X-1.
3. Cleanup - The removal of temporary earth and sandbag fills and other debris should be initiated as soon as possible to permit movement of traffic along normal routes. Street, bridge, and road closures should be opened as soon as water levels have receded. Arrangements for closing the evacuation centers should be made as soon as residents begin to return to their homes. Expeditious cleanup and removal of any equipment from the centers will permit the structure's early return to normal use. General debris and wreckage clearance will be accomplished by the Public Works and

Parks and Recreation Departments (the latter for park and recreation areas only) However, specific types of assistance by State and Federal agencies may be available. Requests for technical and financial assistance should be initiated through the North Dakota Emergency Services Office in Bismarck.

4. EOC Deactivation - As the emergency activities are reduced, the EOC will be gradually phased out until deactivation is directed by the Civil Preparedness Director. All staff at the center will be deactivated, and all records and materials properly stored. A final report on all activities should be prepared by the Civil Preparedness Director regarding major problems encountered and recommendations relating to future flood fights. Building space occupied by the EOC should be cleared and returned to normal use.

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT DAMAGE SURVEY REPORT FEDERAL DISASTER ASSISTANCE ADMINISTRATION (See instructions on reverse of last copy)		3. DECLARATION NO. FDAA		
1. TO  REGION _____ FEDERAL DISASTER ASSISTANCE ADMINISTRATION (FDAA)		4. INSPECTION DATE		
2. APPLICANT (State Agency, County, City, etc.)	PA NO.	5. WORK ACCOMPLISHED BY <input type="checkbox"/> CONTRACT <input type="checkbox"/> FORCE ACCOUNT		
7. WORK CATEGORY ("X" Applicable Box) <input type="checkbox"/> EMERGENCY <input type="checkbox"/> PERMANENT <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E <input type="checkbox"/> F <input type="checkbox"/> G <input type="checkbox"/> H <input type="checkbox"/> I	ITEM NO.	6. PERCENTAGE OF WORK COMPLETED TO DATE %		
8. DAMAGED FACILITIES (Location, identification and description)				
9. DESCRIPTION OF DAMAGE				
10. SCOPE OF PROPOSED WORK				
11. ESTIMATED COST OF PROPOSED WORK				
QUANTITY (a)	UNIT (b)	MATERIAL AND/OR DESCRIPTION (c)	UNIT PRICE (d)	COST (dollars) (e)
12. EXISTING INSURANCE (Type)		AMOUNT \$	TOTAL  \$	
13. RECOMMENDATION BY FEDERAL INSPECTOR (Signature, Agency, date)		Eligible <input type="checkbox"/> YES <input type="checkbox"/> NO	ATTACHMENTS	
14. CONCURRENCE IN REPORT BY STATE INSPECTOR (Signature, Agency, date)		<input type="checkbox"/> YES <input type="checkbox"/> NO	ATTACHMENTS	
15. CONCURRENCE IN REPORT BY LOCAL REPRESENTATIVE (Signature, Agency, date)		<input type="checkbox"/> YES <input type="checkbox"/> NO	ATTACHMENTS	
16. FEDERAL REVIEW (Signature, Agency, date)		FDAA REVIEW (Initials and date)		

INSTRUCTIONS

1. The Damage Survey Report (DSR) is not a Federal approval of this proposed project and does not obligate Federal funds. DSR's are field recommendations which are attached as supporting justification to the applicant's project application, which must be approved by the Governor's Authorized Representative and the FDAA Regional Director. The applicant can be given no assurance of Federal reimbursement for any of the proposed work prior to approval of the project application by the Regional Director.
2. Use this form for the Federal Inspector's Damage Survey Report when required for emergency assistance, debris removal, temporary housing, or permanent repairs, replacement, or other restorative work. Separate DSR's will be prepared for emergency and for permanent work.
3. The Federal Inspector will attach properly captioned and cross referenced maps, sketches, or photos, as necessary to locate or describe the damages and the proposed scope of work. Additional sheets reporting comments by the DSR team members or any other pertinent information may be attached by the Federal Inspector to the original DSR.
4. Description of damages and "Scope of Proposed Work" should be stated in quantitative terms. For example, provide estimated quantities of debris removal or earth movement in cubic yards or tons; provide paving estimates in square feet or square yards; and provide principal dimensions of bridges, retaining walls or other structures as appropriate.
5. The Federal Inspector will attach his comments on each question of eligibility that arises. He should contact the Regional Director for guidance when necessary.
6. Cost estimates must be realistic; based on local conditions for the eligible scope of work without any contingency allowances. Cost breakdown should be sufficiently detailed for professional review including deductions such as salvage or insurance when appropriate. Under DSR Item 12 record the type of insurance coverage in force such as flood or casualty.
7. Under DSR Item 16, the "Federal Review" will be accomplished normally at the FDAA field office by a Federal engineer designated by the Regional Director. The FDAA review will be accomplished prior to distribution of the completed DSR's as indicated below. Based on these DSR reviews, a Federal Inspector may be required to correct errors in the DSR or to repeat field inspections when necessary.
8. Three copies of the DSR will be completed and signed at the time of inspection. The Federal Inspector and the applicant's representative will retain copies. The Federal Inspector will submit the original to the Regional Director for review. The RD will distribute two reproduced copies of completed DSR's to the State Coordinating Officer and two to the Federal agency which provided the inspector. The original will be retained for FDAA record file.

CORPS OF ENGINEERS EMERGENCY SERVICES

Emergency Operations authority is one of five areas included under Public Law 84-99, Flood Control and Coastal Emergencies. Under Emergency Operations the Corps may be requested to supplement local efforts when local, county and State governments have exhausted all their resources and are unable to cope with the situation. Requests for assistance may be made by the community directly to the St. Paul District. However, county and State emergency services should be kept informed.

The District Engineer accomplishes his emergency missions through the Emergency Operations Manager and emergency organization in accordance with policies and principles set forth in this Appendix and ER 500-1-1.

The Corps' emergency assistance is intended to supplement local efforts. While the District Engineer will provide maximum assistance within the limits of his authority, primary responsibility rests with the affected community. The political subdivision requesting assistance must provide an assurance agreement of cooperation and indemnification for assistance under PL 84-99. This agreement should be obtained prior to commencement of operations unless the exigency of the situation warrants otherwise. A declaration of a state of emergency or a written request by the Governor, or responsible local government authority, while desirable, is not a prerequisite to furnishing PL 84-99 assistance.

Code 910-200 applies to emergency flood fighting and rescue and those operations related thereto. It is applicable to any flood control structure - public or private.

Types of assistance available under Emergency Operations consist of the following:

- a. Technical assistance.
- b. Materials to include pumps, sandbags, polyethylene sheeting, lumber, etc.
- c. Rescue in conjunction with the Coast Guard and other agencies.
- d. Lease of construction equipment to build levees or other emergency protective works.

Corps assistance will end when it is determined that the city has the means to handle the flood emergency situations. Normally this occurs after the river levels have returned to safe stages.

Temporary location for Corps operation has been granted to the Water Reclamation Plant at 322 South 3rd Street.

Grand Forks Herald

April 1, 1980

To: Richard Aulich
Frank Orthmeyer
Orley Gunderson

From: Herschel Kenner

Gentlemen:

As promised at our recent meeting about news coverage of floods, here is a list of phone numbers of people on our staff.

If you have any question or doubt about which one to call, please do not hesitate to call me or Tony Benjamin. Someone always will be available to talk about the floods or any other matter of public concern.

Our office phone is 775-4211.

Our home phones are:

Tony Benjamin, managing editor.....	775-7838
Herschel Kenner, city editor.....	775-4337
Ryan Bakken, state editor.....	775-3673
Jack Peckham, reporter (police, fire).....	775-7731
Sue Eilyn Scaletta, reporter (Grand Forks).....	746-7786
Carol Graham, reporter (East Grand Forks).....	746-6164
Randy Howell, weekend editor.....	775-8805
Darrel Koehler, reporter (weather).....	773-9776
John Stennes, chief photographer.....	746-6023
Dean Hanson, photographer.....	746-8605
Vickie Kettlewell, photographer.....	746-8884

Thank you for your cooperation. Here's to hoping to stay dry...

Herschel Kenner

Neighborhood Organizations and Officers

1. RIVERSIDE PARK FLOOD COMMITTEE

	home	work
Lloyd Hillier, Flood Committee Chairman	772-0436	795-4000
LeLand Paulson, Alternate Flood Committee Chairman	772-5672	795-8000
Hal Gershman, Riverside Park Assn., President	775-9732	772-2671
Buster Little, Information Committee	772-9201	772-7156
Bill O'Connell, Information Committee	772-8970	746-1341
Glenn Sparks, Volunteer Committee	772-4547	
Don Tucker, Volunteer Committee	775-6174	

2. CENTRAL PARK DIKE COMMITTEE

Henry J. Tomasek, Chairman	772-1236	777-3035
Walter Knipe, Vice Chairman	772-6767	772-6883
Robert Clausen	772-5690	772-5690
Greg Linde	775-3568	
Willard Lundgren	772-5083	

3. LINCOLN PARK DIKE COMMITTEE

Lloyd Olson	772-5318	775-7601
Wayne Peterson	775-8501	775-6233
Cloyd Steenerson	775-8329	775-8329
Pat Sullivan	775-5092	775-3176

4. 15th AVE. SO. / WALNUT/CHESTNUT

Tom Berge	775-8905	775-4276
Tom Foley	772-3133	775-4891
Ron Ellingson	772-2307	775-5359
Dale Wavra	772-1360	775-8114

5. SOUTHWEST NEIGHBORHOOD ASSOCIATION

Ben Kaufman, Chairman	772-7709	772-7709
Dave Sethre, Flood Committee Chairman	746-6639	772-7156
Richard Janousek	775-3775	781-3761
Roy Becker	772-3523	772-3489

6. UND STUDENT FLOOD ORGANIZATION (Volunteers)

Tod Carlson	746-7043	777-3129
Bruce Haskell	772-9093	777-4200
Dean of Students		777-2664
	also	777-3421
Director of Student Activities Greg Mann		777-3926



CITY OF GRAND FORKS

BOX 1518

GRAND FORKS, NORTH DAKOTA 58201

DEPARTMENT OF PUBLIC WORKS
(INSPECTION DIVISION)

(701) 775-8103

DATE: February 15, 1980

TO: Frank B. Orthmeyer
Director of Public Works

FROM: Al Marvick
Electrical Inspector

RE: Flood

Should a house or other building be subject to flooding, the following preparations should be made in regards to electrical wiring and equipment.

If only limited flooding is expected, the electric power should be disconnected to the circuits for all wiring or equipment which may be flooded. This may be done by removing fuses or turning off circuit breakers for such circuits. All electrical equipment such as appliances, motors, heating equipment and controls which may be moved should be disconnected and stored in a dry location.

When more extensive flooding is expected or if the electric meter or main service panel may be flooded, it will be necessary to disconnect all electric power to the house or building. This disconnection should be done by the power company.

Extreme care must be taken when working with or around electrical wiring or equipment in any damp or wet location. The power must be turned off before disconnecting or removing equipment. Damp or wet electrical wiring and equipment is a shock hazard and also a possible fire hazard.

Following the flood it is most important that all electrical wiring, appliances, or equipment which was flooded be checked to be sure it is clean and dry before power is restored. Wet, damp or dirty equipment, if connected to power, may be damaged or cause a possible shock or fire hazard.

It is recommended that work with electrical wiring and equipment be done by trained or qualified persons only.

Al Marvick



CITY OF GRAND FORKS

BOX 1518

GRAND FORKS, NORTH DAKOTA 58201

DEPARTMENT OF PUBLIC WORKS
(INSPECTION DIVISION)

(701) 775-8103

DATE: February 1, 1980

TO: Frank B. Orthmeyer
Director of Public Works

FROM: Jerry Appert
Plumbing Inspector

RE: Things To Do Before Evacuation of a Home During Flood or Other Disasters

Curb Box:

1. Locate curb box and have local plumber shut off the water to the home or building.

Meter:

2. A temporary alternative would be to shut off the water at the service before the water meter. If there is danger of freezing, remove meter to permit draining the water system.

Sewer:

3. Close backwater valve on the sewer line from the building.
4. If there is no backwater valve and there is imminent danger of flooding or has been flooded in the past, use piping test plug, caps, or wooden plugs in all lower level drains. Remove water closets, and traps on lavatories and sinks on lower level, then plug waste piping at this point to insure a tight seal.

Electrical:

5. In the event of immediate danger of flooding, disconnect the electrical service by switching off main breaker or pulling main fuses. Keep in mind the fact that the sump pump will not operate without power. It may be necessary to operate only the sump pump.

Clear decisions for electrical service have to be made by the homeowner because of the variable conditions that could exist. Examples would be:

- A. If complete flooding and submersion of the electrical

February 1, 1980

panel was possible, the power company would have to be notified to remove the meter.

- B. If only the lower appliances and outlets were to be affected, circuit breakers or fuses might be sufficient to cut the power to the endangered areas.

Cold Weather:

6. If abandoning home in the winter, be sure to follow Items #1 and #2.

Water Heater:

7. Turn off the gas or electricity to the water heater and drain the water heater.

Water Pipes:

8. Drain all water pipes by opening all the faucets and valves.

Fixtures:

9. Take extra precaution to disconnect pipe fittings that are the lowest in the building, such as under basement water closets.
10. Add about a half cup of anti-freeze to each remaining trap, floor drain, water closet and water closet tank.

Appliances:

11. Using a potable (non-toxic) anti-freeze, add one or two cups to automatic washer and dishwasher. Operate machines so that the discharge pump runs. This will avoid freezing and breaking the pumps.

Hot Water Heating Boilers:

12. To prepare hot water heating systems for freezing and to avoid draining in an emergency, add one-fourth to one-half capacity with anti-freeze.
13. Boilers definitely need to be provided with a backflow prevention device; or have an indirect fill to prevent contamination of the domestic water supply.